Epidemic Intelligence Service
50th Annual Conference

April 23–27, 2001

Centers for Disease Control and Prevention

Atlanta, Georgia

Contents

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Epidemiology Program Office

The Epidemiology Program Office gratefully acknowledges the invaluable assistance and cooperation of the Public Health Practice Program Office and the editorial and support staffs of all CDC administrative units participating in the 2001 EIS Conference.

Color Key for Name Tag Ribbons

Blue ..... EIS Alumni/ae
Green ..... Current EIS Officers
Red ..... EIS Recruits
White ..... Guests
Purple ..... CDC Staff
Yellow ..... Press
Burgundy ..... Conference Staff
Orange ..... Recruiters

PREFACE

Dear Friends of EIS:

Welcome to a landmark event — the 50th Annual Epidemic Intelligence Service Conference. We are delighted that you are able to attend our annual conference, which highlights the professional activities of EIS Officers. The scientific program this year includes 76 oral presentations and 30 poster presentations. In addition, your experience this week will be enriched by International Night, the EIS skit, the Prediction Run, special award presentations, and other activities that have long been a tradition in the EIS Conference.

This year, we are celebrating the 50th Anniversary of the Epidemic Intelligence Service. We hope that many of you were able to attend the 50th Anniversary Celebration, Saturday-Sunday, April 21–22, 2001. We will continue to celebrate the accomplishments of the EIS Program on Monday, April 23rd, with an evening reception to be held at the Carter Center. There will be other events during the year as well. Please visit the CDC web site (www.cdc.gov) for information about upcoming events.

One highlight of this year's conference is a special session on Thursday afternoon focusing on developing international capacity in applied epidemiology. This session will feature reports by EIS alumni/ae on their experiences in developing surveillance systems, field epidemiology training programs, and combined laboratory-epidemiology training in Brazil, Japan, Tanzania, and Europe.

We extend a special welcome to the incoming 71 members of the EIS Class of 2001. The Class is composed of a select group of men and women with a broad array of interests and skills. Forty-three (61%) of the new Officers are women and 10 (14%) members of the class are citizens of other nations. Among the 61 who are U.S. citizens, 23 (38%) represent racial and ethnic minority groups. The Class includes 54 physicians, 14 doctoral level scientists, 2 nurses, and 1 veterinarian.

Within the Division of Applied Public Health Training, in September 2000, the fourth class of 25 masters level public health professionals was enrolled in the new Public Health Prevention Service (PHPS), and the first class of PHPS Specialists were graduated from the three-year training program. Over the past year, PHPS Specialists have collaborated with EIS Officers on a number of EPI-AID investigations and other activities (such as disease surveillance during the political conventions, homicide/suicide cluster investigation, and meningococcal carriage among travelers returning from the Hajj). PHPS Specialists have continued to participate with EIS Officers on several of the Stop

Transmission of Polio (STOP) team missions.

The 2001 Conference provides you with the opportunity to hear about many current applications of epidemiology to public health and prevention by EIS Officers. We welcome you to an exciting series of days and evenings in the EIS experience, an opportunity to learn, to meet old friends and new, and to welcome the incoming Officers. I look forward to an opportunity to see you during the week.

Andrew L. Dannenberg, MD, MPH
Director, Division of Applied Public Health Training, EPO

The 51st Annual EIS Conference
is scheduled for
April 22-26, 2002.

Mark your calendars now!

2001 EIS Conference — Schedule

— Monday, April 23, 2001 —

7:30 **Registration Desk Opens**

8:15 **WELCOME AND CALL TO ORDER — Stephen B. Thacker, Director, Epidemiology Program Office**

8:30 **The EIS in Action. Moderator: Jeffrey P. Koplan**

8:35 Seroprevalence of Ebola Virus Antibodies Among Health-Care Workers — Uganda, 2000. *Alicia D. Anderson*

8:55 Risk-Taking Behaviors of Adolescent Drinking Drivers and Their Passengers — Washington, 1999. *Jennifer C. Sabel*

9:15 Multidrug-Resistant Tuberculosis Among Community and Prison Patients — Orel Oblast, Russian Federation, 1999–2000. *Philip R. Spradling*

9:35 Preventable Risk Factors For Sudden Infant Death Syndrome in the "Back To Sleep" Era — Louisiana, 1997–1998. *John A. Painter*

9:55 Investigation of the Barriers to Successful Dietary Control Among Pregnant Women with Phenylketonuria — Georgia, Massachusetts, and North Carolina, 2000. *Amanda S. Brown*

10:15 BREAK

10:45 **Risks of Recreation and Travel. Moderator: Kenneth E. Powell**

10:50 Outbreak of Acute Febrile Illness Among Athletes in "EcoChallenge Sabah 2000" — Borneo, Malaysia, 2000. *James J. Sejvar*

11:10 Epidemiology of Mass Casualties during Bike Week 2000 — Daytona Beach, Florida. *Dafna Kanny*

11:30 Outbreak of Lepidopterism at a Boy Scout Camp — New Mexico, 2000. *John T. Redd*

11:50 Predictors of Injury Among Bicyclists in a Recreational Long Distance Bicycle Tour — Iowa, 2000. *Michael A. Buley*

12:15 LUNCH

— Monday–Tuesday Poster Session, The Garden Overlook —

(Posters will be on display from Monday, 8:00 a.m., until Tuesday, 3:00 p.m.)
(Authors will be present to discuss their studies on Tuesday, 12:30–1:30 p.m.)

Foodborne Diseases

P1. Listeria-Associated Birth Complications Linked With Homemade Mexican-style Cheese — Winston-Salem, North Carolina, 2000. *Pia D. M. MacDonald*

P2. Outbreak of Norwalk-Like Virus Associated With Foodhandlers: Using New DNA Primers to Detect Duration of Viral Shedding — Los Angeles, 2000. *Elizabeth A. Bancroft*

P3. Staphylococcal Food Intoxication Associated with Eating Pork Barbecue — Georgia, 2000. *Susan H. Wootton*

P4. A Large Gastroenteritis Outbreak Caused by Norwalk-like Virus from a Salad Bar — Nashville, Tennessee, 2000. *Joseph F. Perz*

P5. *Escherichia coli* O157:H7 Outbreak Associated with a Self-Service Food Bar in an Elementary School — Wisconsin, 2000. *Donita R. Croft*

Surveillance: The Foundation of Public Health

P6. Hysterectomy Surveillance — United States, 1994–1998. *Homa Keshavarz*

P7. Quality of Birth Certificate Data on Tobacco and Alcohol Use During Pregnancy — Great Lakes Region, United States, 1989–1995. *Marc G. Weisskopf*

P8. Estimating Deaths Due to *Streptococcus pneumoniae* — United States, 1996–1998. *Matthew R. Moore*

P9. Evaluation of Electronic Laboratory-based Reporting of Notifiable Infectious Diseases at a Large Health System — Allegheny County, Pennsylvania, 2000. *Anil A. Panackal*

P10. Completeness of Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome Reporting Among American Indians — New Mexico, 1980–2000. *Richard F. Leman*

Health Hazards Among Injecting Drug Users and Prisoners

P11. Rapid Evolution of HIV Among Injection Drug Users — Vietnam, 1996–1999. *Vu Minh Quan*

P12. Investigation of an Outbreak of Hepatitis B Among Injecting Drug Users — Pierce County, Washington, 2000. *Stephanie R. Bialek*

P13. Outbreak of Unexplained Death and Illness Among Injecting-Drug Users — Dublin, Ireland, 2000. *Kristy O. Murray*

P14. Hepatitis C Seroprevalence Among Participants in a Court-Mandated Drug Rehabilitation Program — San Diego County, California, 1999–2000. *David B. Callahan*

P15. An Outbreak of Methicillin-Resistant *Staphylococcus aureus* Infections in a Prison — Mississippi, 2000. *Bruno P. Coignard*

1:30 Health Policy and Health Promotion. Moderator: Jennifer H. Madans

1:35 Does Insurance Decrease Women's Risk for Multiple Births Associated with Assisted Reproductive Technology? *Meredith A. Reynolds*

1:55 An Evaluation of Releasing Pre-Adoption Birth Records to Adoptees — Oregon, 2000. *Julia C. Rhodes*

2:15 Implementation of Hepatitis B Vaccination Recommendations in Adolescents in Three Health Maintenance Organizations — United States, 1995–1998. *Idalia M. Gonzalez*

2:35 Testing for Colorectal Cancer Among an Insured Population of a Midwestern Manufacturer — United States, 1993–1999. *Reuben K. Varghese*

2:55 BREAK

3:15 **Emerging and Reemerging Health Threats. Moderator: James M. Hughes**

3:20 Outbreak of Community-Acquired Methicillin-resistant *Staphylococcus aureus* (MRSA) Skin Infections Among Alaska Natives — Southwestern Alaska, 2000. *Henry C. Baggett*

3:40 Real-Time, Web-Based Syndromic Surveillance During the Democratic National Convention — Los Angeles, 2000. *Elizabeth A. Bancroft*

4:00 Outbreak of Diphtheria Among Highly Vaccinated Military Trainees — Riga, Latvia, 2000. *Chima John Ohuabunwo*

4:20 Fluoroquinolone-Resistant Campylobacter Infections in the United States, 1997-2000: National Antimicrobial Resistance Monitoring System's Data lead to Regulatory Action. *Amita Gupta*

4:40 Projections of Influenza Mortality — United States, 2000–2030. *Scott A. Harper*

6:00 50th Anniversary Reception — Carter Center Library

— Tuesday, April 24, 2001 —

8:30 Worker Safety and Health. Moderator: Mitchell Singal

8:35 Lawnmower Tularemia — Martha's Vineyard, Massachusetts, 2000. *Katherine A. Feldman*

8:55 Factors Affecting Pilot Survival in Work-Related Aviation Crashes — Alaska, 1990-1999. *Diana M. Bensyl*

9:15 Investigation of a Suspected Legionnaires' Disease Outbreak in a Car Parts Manufacturing Plant — Georgia, 2000. *Michael T. Martin*

9:35 Human Anthrax Associated with an Epizootic — North Dakota, 2000: What's the Risk? *Peter M. Dull*

9:55 Risk Assessment of Nosocomial Transmission of *Mycobacterium tuberculosis* — Veterans General Hospital, Taipei, Taiwan, 2000. *Marion A. Kainer*

10:15 BREAK

10:45 Tuberculosis. Moderator: Kenneth G. Castro

10:50 Tuberculosis in a Homeless Population — Raleigh, North Carolina, 1999-2000. *Peter D. McElroy*

11:10 *Mycobacterium tuberculosis* Contamination and Potential Exposure from a Bronchoscope — Pennsylvania, 2000. *Janet L. Larson*

11:30 Treating Tuberculosis Disease in Russia: Results from a Demonstration Control Program, 1999-2000. *Lorna E. Thorpe*

11:50 LUNCH

12:30 Monday-Tuesday Poster Session — Meet the Authors, The Garden Overlook
(See the Monday schedule for list of presentations.)

1:30 Physical Activity and Cardiovascular Health. Moderator: H. Wayne Giles

1:35 Why Children in the United States Do Not Walk or Bike to School: 1999 Survey Elucidates Parental Concerns. *Catherine E. Staunton*

1:55 Physical Activity in Georgia, 1999: If You Ask a New Question, Do You Get a New Answer? *Regina L. Tan*

2:15 Prevalence of Lower Extremity Arterial Disease Among American Indians — Bemidji Service Area, United States, 1992–1994. *Verna L. Lamar Welch*

2:35 Gender Differences in Stroke Subtype Mortality Among Racial/Ethnic Populations — United States, 1995–1998. *Carma S. Ayala*

2:55 Cardiovascular Disease Risks and Hospitalization in Oregon's Medicaid Population, 1998–1999. *Amy D. Sullivan*

3:15 BREAK

3:35 Waterborne Diseases. Moderator: Eric D. Mintz

3:40 Effective Treatment of *Helicobacter pylori* Infection in a High Prevalence Rural Bolivian Population Using Directly Observed Therapy. *Sumathi Sivapalasingam*

4:00 Effect of Maternal Consumption of Arsenic in Drinking Water on Perinatal Outcomes in Nine Michigan Counties, 1989–1998. *Melinda J. Wilkins*

4:20 A Novel Technology to Purify Water: Microbiologic Evaluation of Combined Flocculation and Chlorination of Household Drinking Water — Guatemala, 2000. *Josefa M. Rangel*

4:40 Sporadic *Salmonella* Bareilly Infections Linked with Well, Spring and Bottled Water — Southeastern United States, April–August 2000. *Valerie D. Garrett*

5:15 Prediction Run, Lullwater Park

– Special Session: International Night, Emory Amphitheater –

Sponsored by the Training in Epidemiology and Public Health Interventions Network (TEPHINET)

7:00 **International Health: Information for Action. Moderator: James W. Curran**
Presentation of the Paul C. Schnitker International Health Award.
Memorial to Dr. Matthew C. Lukwiya.

7:15 Oculo-Respiratory Symptoms Associated with Influenza Immunization — Canada, 2000. *Eleni Galanis*
7:35 Dysentery Outbreak at Chikurubi Maximum Prison — Goromonzi District, Zimbabwe, 1999. *Eugen Manyora*
7:55 Malnutrition and Mortality During a Famine — Gode District, Ethiopia, August, 2000. *Peter Salama*
8:15 Situation Analysis: Motorcycle Injury and Motorcyclists' Helmet Use — Thailand, 1995–1998. *Namwat Chawetsan*
8:35 Waterborne Outbreak of Gastroenteritis Associated with a Contaminated Municipal Water Supply — Walkerton, Ontario, Canada, 2000. *Julie A. Stratton*

Late-Breaking Reports:

8:55 Poliovirus Type 1 Outbreak, 2000–2001 — Dominican Republic. *Juaquino Rosario*
9:10 Control of an Outbreak of Viral Hemorrhagic Fever — Uganda, 2000–2001. *Margaret Lamunu*
9:25 Presentation of William H. Foege Award. Closing Remarks. Reception.

— Wednesday, April 25, 2001 —

8:30 **Perinatal, Neonatal and Infant Health. Moderator: Coleen Boyle**

8:35 Unrecognized Deaths: Perinatal Mortality in the United States, 1995–1997. *Wanda D. Barfield*
8:55 Infant Mortality Disparities in 60 Large U.S. Cities, 1995–1997. *Scott S. Santibanez*
9:15 Associations between Psychosocial Factors and Intrauterine Growth Retardation — California, 1998. *Sharon Durousseau*
9:35 Cluster Investigation of Orofacial Clefts — Dickson County, Tennessee, 1997-2000. *Dana C. Crawford*
9:55 Prevention of Birth Defects with Folic Acid Use — China, 1993–1995. *Melanie F. Myers*
10:15 BREAK

10:35 **Iatrogenic Diseases. Moderator: William Schaffner**

10:40 A Cluster of Intra-Operative Deaths in a Liver Transplant Center Associated With the Use of Solvent/Detergent Plasma — California, 2000. *Bruno P. Coignard*
11:00 Sternal Site Infection Following Coronary Artery Bypass Graft Surgery — New York, 1999–2000. *Lorraine N. Alexander*
11:20 A Multi-State Investigation of Transfusion Reactions Among Recipients of Leukocyte-Reduced Red Blood Cell Units — United States, 2000. *Francisco J. Alvarado-Ramy*
11:40 Unsafe Injection Practices — Niger, 2000. *John A. Painter*
12:00 LUNCH

— Wednesday–Thursday Poster Session, The Garden Overlook —

(Posters will be on display from Wednesday 8:00 a.m., until Thursday, 3:00 p.m.)
(Authors will be present to discuss their studies on Thursday, 12:30–1:30 p.m.)

Nosocomial Infections

P1. Hepatitis C Virus Transmission Among Patients at a Chronic Hemodialysis Center — Ohio, 2000. *S. Deblina Datta*

P2. Prevalence of Nosocomial Infections in Neonatal Intensive Care Unit Patients: Results from the First National Point-Prevalence Survey — United States, 1999. *Annette H. Sohn*

P3. *Alcaligenes xylosoxidans* Infections at an Extended Care Facility — New York City, 1999-2000. *Michael S. Phillips*

P4. A National Point-Prevalence Survey of Pediatric Intensive Care Unit-Acquired Infections — United States, 1999. *Lisa A. Grohskopf*

Children's Health

P5. Varicella Breakthrough in Asthmatic Children — West Coast, United States, 1995–1999. *Thomas M. Verstraeten*

P6. Sociodemographic Risk Factors Among Children with Autism — Metropolitan Atlanta, 1996. *Perpetua Socorro Gonzaga*

P7. The Epidemiology of Kawasaki Syndrome — Georgia, 1997–1998: Analysis of Hospital Discharge Data. *Robert V. Gibbons*

Vector-borne Diseases

P8. Epidemiologic Characteristics of an Outbreak of Tick-Borne Disease at Fort Chaffee, Arkansas, and Comparison of Two Diagnostic Assays for Spotted Fever Group Rickettsia. *Candace L. McCall*

P9. West Nile Virus Returns: Results of Serosurveys in Three Northeast U.S. Communities, 2000. *Steven R. Hinten*

P10. Counting Crows: Crow Mortality as a Sentinel for West Nile Virus Disease in Humans — Northeastern United States, 2000. *Kathleen G. Julian*

P11. Imported Animals and International Travelers as Potential Sources of West Nile Virus — New York, 1999. *Daniel A. Singer*

Fungal and Parasitic Diseases

P12. Blastomycosis in Missouri, 1992–1999: Epidemiology and Risk Factors for Endemic Disease. *Maria V. Cano*

P13. Outbreak of Eosinophilic Meningitis Caused by *Angiostrongylus cantonensis* Among Travelers to Jamaica, 2000. *Margaret Mary Cortese*

P14. Malaria Microscopy in Eight Secondary Health Care Facilities — Ouémé Department, Bénin, 2000. *Timothy H. Holtz*

P15. A *Cryptosporidium parvum* Outbreak at a Private Swimming Club — Delaware County, Ohio, 2000. *Els A.J. Mathieu*

1:30 Sexually Transmitted Diseases. Moderator: Judith N. Wasserheit

1:35 Water, Food, and Now Sex: An Outbreak of Typhoid Fever Transmitted Through Sexual Contact — Ohio, Kentucky, and Indiana, 2000. *Megan E. Reller*

1:55 Large *Shigella sonnei* Outbreak Among Gay Men — San Francisco, 2000. *Gwendolyn P. Hammer*

2:15 Outbreak of Hepatitis B Virus Infection at a Correctional Facility — 2000. *Amy J. Khan*

2:35 Case-Control Study of Risk Factors for Acquiring Infectious Syphilis Among Men Who Have Sex with Men — Los Angeles, 2000. *Catherine A. McLean*

2:55 Should We Continue to Co-Treat Gonorrhea Patients for Chlamydia? Co-Infection Rates from Five Sexually Transmitted Disease Clinics — United States, 1993–1996. *Sheryl B. Lyss*

3:15 Risk Factors for Sexually Transmitted Diseases in Adolescents: An Audio-computer Self-interviewing Survey with Noninvasive Specimen Collection — Chiang Rai, Thailand, 1999. *Gabriela Paz-Bailey*

3:35 BREAK

4:00 Announcement of Langmuir Prize Winner

ALEXANDER D. LANGMUIR MEMORIAL LECTURE and RECEPTION — Sponsored by Sigma Xi, the EIS Alumni/ae Association, and the Epidemiology Program Office.

Speaker: J. Donald Millar, M.D.

Topic: "Halfway Through a Century of Excellence"

5:30 EIS Alumni Association Meeting — Mountain Laurel, Emory Conference Center Hotel

— Thursday, April 26, 2001 —

8:30 Environmental Health. Moderator: Thomas H. Sinks

8:35 Consumption of Polychlorinated Biphenyl-Contaminated Great Lakes Fish is Associated with Low Birth Weight — Great Lakes Region, United States, 1970–1995. *Marc G. Weisskopf*

8:55 Blood Lead Levels Among Children in Yap State — Federated States of Micronesia, April–May 2000. *Jeffrey B. Nemhauser*

9:15 Relationship Between Housing Age and Childhood Blood Lead Levels in Children — Jefferson County, Kentucky, 1991–2000. *Dennis Y. Kim*

9:35 Restaurant-Associated Outbreak Possibly Linked to Methomyl Poisoning — Ohio, 2000. *Mark E. Beatty*

9:55 Respiratory and Circulatory Hospital Admissions Associated with Forest Fires — Montana, July–September, 1999 and 2000. *R. Charon Gwynn*

10:15 BREAK

10:35 Mackel Award Finalists. Moderator: Stephen M. Ostroff

10:40 Outbreak of *Escherichia coli* O157:H7 Infections Associated with Farm Visits — Pennsylvania, 2000. *John A. Crump*

11:00 Illness and Death in Hemodialysis Patients Due to Parenteral Exposure to Sulfur-containing Compounds — Ohio, 2000. *Dejana Selenic*

11:20 When Beauty Is More Than Skin Deep: An Outbreak of Rapidly Growing Mycobacterial Furunculosis Associated with a Nail Salon — California, 2000. *Kevin L. Winthrop*

11:40 Bath Towels, Body Shaving and Turfburns: An Outbreak of Methicillin Resistant *Staphylococcus aureus* in a College Football Team — Pennsylvania, 2000. *Marion A. Kainer*

12:00 LUNCH

12:30 Wednesday–Thursday Poster Session — Meet the Authors, The Garden Overlook
(See the Wednesday schedule for the list of presentations.)

— Special Session: Emory Amphitheater —

12:30 Developing International Capacity in Applied Epidemiology — Experiences of EIS Alumni/ae. Moderator: Mark H. White. Participants: Alain Moren (EIS '85), Denise Oliveira Garrett (EIS '96), Christopher Tetteh (EIS '96), Hiroshi Takahashi (EIS '97), and Denis Coulumbier (EIS '91).

1:45 Primum Non Nocere: Assessing the Safety of Interventions. Moderator: Susan Y. Chu
Presentation of the Iain C. Hardy Award

1:50 Risk of Demyelinating Disease after Hepatitis B Vaccination — West Coast, United States, 1995–1999. *Thomas M. Verstraeten*

2:10 Secondary Effects of Mass Chemoprophylaxis with Azithromycin to Eliminate Blindness Due to Trachoma — Nepal, 2000. *Alicia M. Fry*

2:30 Risk of Seizures Following Acellular Pertussis Vaccine — United States, 1992–1999: Results from the Vaccine Safety Datalink. *Young Joo Hur*

2:50 Allergic Reactions to Genetically Modified Corn in the Human Food Supply — United States, 2000. *Brad S. Winterton*

3:10 BREAK

3:35 Vector-borne Diseases. Moderator: James L. Hadler
Presentation of the James H. Steele Veterinary Public Health Award

3:40 Health-Care Seeking Behavior and Home Treatment for Febrile Illness — Blantyre District, Malawi, 2000. *Timothy H. Holtz*

4:00 Risk Factors for Infection During a Severe Dengue Outbreak — El Salvador, 2000. *John M. Hayes*

4:20 Adverse Event Reports Following Vaccination for Lyme Disease — United States, 1998–2000. *Sarah L. Lathrop*

4:40 A Follow-Up Study of New York City Residents Infected During a 1999 Outbreak of West Nile Viral Disease. *Denis Nash*

8:30 EIS Satirical Review

— Friday, April 27, 2001 —

8:30 Violence and Health. Moderator: Melvin A. Kohn

8:35 Mental Health Outcomes Among Expatriate Relief Workers — Kosovo, June, 2000. *Peter Salama*

8:55 Help-Seeking Behavior Prior to Nearly Lethal Suicide Attempts: A Case-Control Study of Attempted Suicide — Houston, Texas, 1992–1995. *Lauren S. Barnes*

9:15 Female Intimate Partner Homicide-Suicide Events — Virginia, 1990–1999. *Krista R. Biernath*

9:35 Firearm-Related Injuries in Alaska, 1996–1998. *Louisa J. Castrodale*

9:55 BREAK

10:15 Mackel and Poster Awards

10:30 Latebreaking Reports. Moderator: Ann M. Dellinger

12:15 LUNCH

1:30 HIV/AIDS. Moderator: James W. Buehler

1:35 Class II Human Leukocyte Antigen (HLA) DRB3 Discordance is Associated with Human Immunodeficiency Virus (HIV) Discordance in Heterosexual Couples — United States, 2000. *Shannon L. Hader*

1:55 Maternal Malaria Infection and Perinatal Transmission of Human Immunodeficiency Virus in a Malarious Area — Western Kenya, 1996–2000. *Robert D. Newman*

2:15 Evaluation of a Pilot Program to Prevent Mother-to-Child Human Immunodeficiency Virus Transmission — Northeastern Thailand, 1998–2000. *Monica L. Nolan*

2:35 The Changing Epidemiology of Cryptococcosis Among Persons with AIDS — Atlanta and Houston, 1993–1999. *Maria V. Cano*

2:55 Mortality and Survival Among Reported Acquired Immunodeficiency Syndrome Cases — New York City, 1993–1998. *Denis Nash*

3:15 Closing Remarks and Adjournment: Stephen B. Thacker, Director, Epidemiology Program Office

Index to Presentations — 2001 EIS Conference

Abbreviations

Epidemiology Program Office ..... EPO
National Center for Chronic Disease Prevention and Health Promotion .. NCCDPHP
National Center for Environmental Health ..... NCEH
National Center for Health Statistics ..... NCHS
National Center for HIV, STD, and TB Prevention ..... NCHSTP
National Center for Infectious Diseases ..... NCID
National Center for Injury Prevention and Control ..... NCIPC
National Immunization Program ..... NIP
National Institute for Occupational Safety and Health ..... NIOSH

Presenting EIS Officers, by Center, Institute, Office

EPO

Elizabeth Bancroft
Michael Buley
David Callahan
Louisa Castrodale
Margaret Mary Cortese
Donita Croft
Sharon Durousseau
Gwendolyn Hammer
Richard Leman
Pia MacDonald
Denis Nash
John Painter
Joseph Perz
Michael Phillips
John Redd
Jennifer Sabel
Amy Sullivan
Regina Tan
Reuben Varghese
Marc Weisskopf
Melinda Wilkins
Kevin Winthrop
Susan Wootton

NCCDPHP

Wanda Barfield
Perpetua Gonzaga
Homa Keshavarz
Meredith Reynolds
Scott Santibanez

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Amanda Brown
Dana Crawford
R. Charon Gwynn
Dennis Kim
Melanie Myers
Peter Salama
Brad Winterton

NCHS

Julia Rhodes

NCHSTP

Shannon Hader
Janet Larson
Sheryl Lyss
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Monica Nolan
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Philip Spradling
Lorna Thorpe

NCID

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Francisco Alvarado-Ramy Alicia Anderson
Henry Baggett
Mark Beatty
Stephanie Bialek
Maria Cano
Bruno Coignard
John Crump
S. Deblina Datta
Peter Dull
Katherine Feldman
Valerie Garrett
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Jeffrey Nemhauser

NIP

Young Hur
Chima John Ohuabunwo
Thomas Verstraeten

Field Epidemiology Training Program

Namwat Chawetsan
Eleni Galanis
Margaret Lamunu
Eugen Manyora
J. Rosario
Julie A. Stratton

ABSTRACTS

Monday Morning — April 23, 2001

8:30 The EIS in Action. Moderator: Jeffrey P. Koplan

8:35 ***Alicia D. Anderson, M. Lukwiya, F. Kaducu, D. Bausch, A. Sanchez, P. Rollin***
Seroprevalence of Ebola Virus Antibodies Among Health-Care Workers — Uganda, 2000

Background: Ebola virus, a cause of severe hemorrhagic fever in humans, is characterized by person-to-person transmission, extensive nosocomial transmission, and a high fatality rate. In early October 2000, an outbreak of Ebola hemorrhagic fever was recognized in Uganda after a nosocomial cluster occurred among the medical ward staff at a hospital in Gulu, resulting in the deaths of three student nurses. We performed a serologic survey among health-care workers at two Gulu hospitals to determine the prevalence of Ebola virus antibodies and presence of asymptomatic infection among hospital personnel.
Methods: A questionnaire was administered to all hospital personnel willing to participate, and a blood specimen was collected from each subject. Serologic specimens were tested for IgG antibodies using an enzyme-linked immunosorbent assay with Ebola (subtype Zaire) virus antigen.
Results: Preliminary laboratory results showed eight (2%) of 318 health-care workers to have IgG antibody to Ebola virus. Seven of the IgG antibody-positive individuals reported at least one clinical symptom in the preceding 3 months. The attack rate among personnel in the cohort surveyed was 9% (4/46) for nurse's aids, 25% (1/4) for student clinical officers, 6% (2/35) for cleaners, and 2% (1/49) for nurses. The occupation of nurse's aid was significantly associated with antibody positivity (Relative Risk=3.7; 95% Confidence Interval=1.7–7.8).
Conclusions: The presence of eight IgG antibody-positive individuals in this serosurvey confirms that infection with Ebola virus may occur without the presence of severe clinical symptoms requiring hospitalization. Strict adherence to barrier nursing techniques, awareness of potential risks, and education is necessary to prevent patient-to-staff transmission of Ebola virus.

Key words: Ebola, health-care worker, antibody, nosocomial

8:55 ***Jennifer C. Sabel, L. Bensley, J. VanEenwyk***
Risk-Taking Behaviors of Adolescent Drinking Drivers and Their Passengers — Washington, 1999

Background: In Washington State, motor vehicle crash injuries are the leading cause of death for persons aged 15–24 years. Nationally, alcohol-impaired driving is the leading cause of death for persons aged < 35 years. Because drinking and driving in Washington adolescents has not decreased since 1992, identifying at-risk persons is important for prevention.
Methods: The 1999 Washington State Youth Risk Behavior Survey asked 3,602 high school students if they were a passenger of, or had been a drinking driver in the past month. We divided the adolescents into three mutually exclusive groups: 1) drinking drivers (DD), 2) passengers of drinking drivers (PoDD), and all others (referent). Comparisons were made using multiple logistic regression in SUDAAN; all models included sex and scholastic grade as covariates.
Results: DD was reported by 457 (13.0 %) adolescents, and 1,048 (29.3%) reported PoDD. Compared with the referent group, DD and PoDD were more likely to report cigarette smoking in the past month (odds ratio [OR]=3.0, 95% confidence interval [CI]= 2.1–4.4 and OR=2.2, 95% CI=1.7–2.8, respectively), not routinely wearing seat belts (OR=2.8, 95% CI=1.9–4.3 and OR=2.2, 95% CI=1.6–2.9), physical fighting in the past year

(OR=1.5, 95% CI=1.1–2.1 and OR=1.9, 95% CI=1.5–2.4), and binge drinking (OR=27.0, 95% CI=18.5–39.5 and OR=3.7, 95% CI=2.8–5.0). A positive dose-response relation was observed between frequency of DD and PoDD and likelihood of risky behavior.
Conclusions: Adolescents who reported DD and PoDD reported higher levels of other risky behavior. Lack of seatbelt use in adolescents who drink and drive could contribute to an increased risk for motor vehicle injury and fatality.

Key words: adolescence, alcohol drinking, risk factors, automobile driving

9:15 ***Philip R. Spradling, E. Nemtsova, T. Aptekar, S. Marina, L. Rybka, C. Wells, G. Aquino, H. Kluge, W. Jakubowiak, N. Binkin, B. Kazionny***
Multidrug-Resistant Tuberculosis Among Community and Prison Patients — Orel Oblast, Russian Federation, 1999–2000

Background: Attention has focused on the transmission of multidrug-resistant (resistance to at least isoniazid/rifampicin) tuberculosis (MDR-TB) in Russian prisons. In Orel Oblast, site of a recently implemented project using directly-observed treatment, short-course (DOTS), a survey of antituberculosis drug susceptibility test (DST) results was undertaken to determine baseline levels of resistance in community and prison patients and evaluate the need for an MDR-TB treatment program.
Methods: We reviewed DST records from July 1, 1999 to June 30, 2000 for patients with sputum acid-fast bacilli (AFB) smear-positive pulmonary TB. History of prior treatment and incarceration status were obtained from the TB register. Patients with ≤1 month of prior treatment were defined as new cases, while those treated for >1 month were defined as retreatment cases.
Results: Of 246 sputum AFB smear-positive specimens, 212 (86 %) had DST results. Of the 212, 171 (80.7%) were from community and 41 (19.3%) were from prison patients; 14 (6.6%) of 212 were MDR-TB. Retreatment cases (n=22) were more likely than new cases (n=190) to have MDR-TB (31.8% vs. 3.7%, OR=8.6, 95% CI=3.3–22.3). Community MDR-TB patients (n=9) were less likely than prison MDR-TB patients (n=5) to have had previous treatment for TB (22.2% vs. 100%, p = 0.02, 2-tailed Fisher exact). Controlling for incarceration status, retreatment cases were more likely than new cases to have MDR-TB (Mantel-Haenszel weighted OR=20.8, CI=2.8–69.3).
Conclusions: In Orel, previous treatment for TB rather than incarceration status was associated with MDR-TB. Priority should be given to rapid expansion of the DOTS strategy to prevent further generation of MDR-TB, although treatment of MDR-TB will also be needed in both the prisons and the community to reduce the existing reservoir.

Key words: tuberculosis, drug resistance, surveillance, Russia

9:35 ***John A. Painter, T. Farley***
Preventable Risk Factors For Sudden Infant Death Syndrome in the "Back To Sleep" Era — Louisiana, 1997–1998

Background: Sudden infant death syndrome (SIDS) is the leading cause of mortality for infants aged 1–11 months. Prevention programs aim to reduce SIDS by preventing sleeping in the prone position. Our objectives were to determine risk factors for SIDS in Louisiana after implementation of these programs.
Methods: We conducted an unmatched case-control study using three different data sources—the Louisiana Child Death Review Panel (CDRP) records of infant death investigations, the Louisiana Pregnancy Risk Assessment Monitoring System (PRAMS), and birth certificate records. We identified 117 case-patients from CDRP and 3,119 controls from PRAMS for 1997–1998, which we then linked with birth certificate records.
Results: Multivariate analysis that controlled for race, parity, birthweight, and education indicated postnatal secondhand smoke exposure (odds ratio [OR]=4.3, 95% confidence interval [CI]=2.7–7.1) and failure to breastfeed (OR=2.8, CI=1.5–5.2) as significant modifiable risk factors. Neither prone sleep position (OR=1.3,

CI=.8–2.2) nor maternal prenatal smoking was significantly associated with SIDS. Attributable risk fractions were 55% for not being breastfed and 27% for postnatal smoke exposure.
Conclusions: The strongest modifiable risk factors currently associated with SIDS in Louisiana are not being breastfed and postnatal exposure to smoke. Prone sleep position is not currently a strong risk factor for SIDS. Thus, SIDS prevention programs in Louisiana should focus on encouraging breast-feeding and eliminating smoke exposure.

Key words: sudden infant death, risk factors, smoking, breast feeding, prone position

9:55 ***Amanda S. Brown, S. Rasmussen, S. Waisbren, J. Morris, A. Kenneson, P. MacDonald, P. Fernhoff, R. Singh, D. Frazier***
Investigation of the Barriers to Successful Dietary Control Among Pregnant Women with Phenylketonuria — Georgia, Massachusetts, and North Carolina, 2000

Background: Newborn screening programs and early dietary intervention have prevented mental retardation in an estimated 14,000 children with phenylketonuria (PKU) in the United States since 1965. Currently, an estimated 3,000 women with PKU are of reproductive age; their infants have a 90% chance of mental retardation or major birth defects if maternal diet is not controlled before and during pregnancy. However, the extremely restrictive diet is often discontinued during adolescence and returning to the diet is difficult. Recent births of affected children emphasized the need to identify barriers prohibiting women with PKU from achieving dietary control during pregnancy.
Methods: To investigate these barriers, we used a structured questionnaire to interview women with PKU who were known to metabolic disease clinics in Georgia, Massachusetts, and North Carolina and who were pregnant during 1998–2000, regardless of pregnancy outcome or dietary treatment.
Results: Of the 22 women in our sample, 14 (64%) were not on diet before their most recent pregnancy, although they initiated diet during pregnancy. Sixteen (73%) were no longer on diet at the time of interview. Only eight (32%) reported their obstetricians were familiar with the special dietary requirements for pregnant women with PKU. Of the 12 women enrolled in state-based assistance programs, seven reported that proof of pregnancy was required for eligibility. Many women who used private insurance reported their insurer was unwilling to pay for medical foods.
Conclusions: Our initial findings suggest that: 1) women with PKU and their obstetricians need further education about the importance of dietary control before conception and 2) discrepancies must be resolved between medical recommendations for women with PKU and the policies of public and private insurers.

Key words: phenylketonuria, maternal phenylketonuria, neonatal screening, diet therapy, delivery of health care

10:45 Risks of Recreation and Travel. Moderator: Kenneth E. Powell

10:50 ***James J. Sejvar, E. Bancroft, J. Bettinger, K. Winthrop, M. Bajani, S. Bragg, K. Shutt, R. Kaiser, N. Marano, D. Ashford, L. Mascola, D. Vugia, N. Rosenstein, the EcoChallenge Investigation Team***
Outbreak of Acute Febrile Illness Among Athletes in "EcoChallenge Sabah 2000" — Borneo, Malaysia, 2000

Background: Sixty million Americans travel internationally each year, and "adventure travel" is becoming more popular, increasing the likelihood of contact with unusual pathogens. We investigated an outbreak of febrile illness among athletes in the "EcoChallenge–Sabah 2000" multisport race in Malaysian Borneo [8/21–9/1/00] to determine illness etiology, assess risk factors, and implement public health measures.
Methods: A questionnaire was administered to, and serum obtained from, EcoChallenge athletes. A case was defined as fever occurring on or after 8/21/00, with $\geq$ 2 of the following: chills, myalgias, headache, diarrhea, or conjunctivitis.

Results: Of 304 athletes, we contacted 158 (52%), 126 from 29 U.S. states, and 32 from 26 countries. Median age was 34 (range 22–50); 74% were male. Sixty-eight (44%) met our case definition. Twenty-five (33%) case-patients were hospitalized; none died. Conjunctivitis, a hallmark of leptospirosis, was present in 36 (53%) case-patients. In univariate analysis, kayaking (relative risk [RR]=3.1; 95% confidence interval [CI]=1.5–6.4); swimming in River A (RR=2.5; 95% CI=1.7–3.5); and spelunking (RR=2.3; 95% CI=1.4–3.7) were risk factors. Using logistic regression, only swimming in River A remained an independent risk. Twenty (63%) of 32 case-patients tested positive for leptospiral antibodies; one was culture-positive for leptospires.
Conclusions: Based on the data supporting leptospirosis as the cause of this outbreak, the 44% attack rate, and numerous hospitalizations, we recommended specific antibiotic treatment for all athletes on 9/11/00. As adventure travel increases, leptospirosis outbreaks may become more frequent; preexposure chemoprophylaxis for leptospirosis (200 mg oral doxycycline/week) may decrease risk of illness in adventure travelers. Additional efforts are needed to inform adventure travel organizers and participants of unique infection risks such as leptospirosis.

Key words: Leptospirosis, febrile illness, immunoassay, adventure travel

11:10 *Dafna Kanny, R. Schieber, B. Jones, B. Sorensen*
Epidemiology of Mass Casualties during Bike Week 2000 — Daytona Beach, Florida

Background: In March 2000, an annual 10-day motorcycle event was held in Daytona Beach, Florida. Initial news reports suggested that this event was the deadliest ever and brought an estimated 500,000 to 600,000 participants to a city of 64,000 residents. We investigated the frequency, disposition, and risk factors for motorcycle-related deaths and injuries during the event.
Methods: Data from all motorcycle crashes were abstracted and linked from medical examiner, hospital, EMS, and police sources throughout the county for Bike Week 2000 and compared with data from Bike Week 1999.
Results: During Bike Week 2000, 570 people were involved in 281 motorcycle-related crashes, of whom 230 (40%) were injured. Eleven (5%) died, 72 (31%) were hospitalized, and 147 (64%) sought treatment in emergency departments. Most were white (96%), middle-aged (71%), male (77%), motorcycle drivers (72%). When a motorcycle crashed with a passenger vehicle, motorcycle occupants were 8.7 times more likely to be injured than passenger vehicle occupants (95% CL 1.7,15.7). In Bike Week 1999, the motorcycle-related injury rate per 10,000 population was 3.7 (estimated 450,000 participants). In Bike Week 2000, this rate ranged from 3.8 (assuming 600,000 participants) to 4.6 (assuming 500,000 participants). Accordingly, the rate ratio between the two events ranged from 1.0 (95% CL 0.9,1.2) to 1.2 (95% CL 1.1,1.4). Key known risk factors (blood alcohol concentration, vehicle speed, helmet use) were substantially underreported and could not be analyzed.

Conclusions: Although fatalities first called attention to the problem, non-fatal injuries outnumbered deaths 20-fold. Because such large-scale events recur often, better field reports of risk factors are vital for prevention efforts, and accurate reproducible methods of crowd estimates are needed for surveillance.

Key words: motorcycle, injury, accident, deaths

11:30 *John T. Redd, R. Voorhees*
Outbreak of Lepidopterism at a Boy Scout Camp — New Mexico, 2000

Background: *Lepidopterism* refers to the adverse medical effects (typically nonimmunological contact urticaria) of contact with certain insects of the order Lepidoptera. Outbreaks of lepidopterism typically occur in human populations when caterpillar populations increase suddenly. We investigated an outbreak of caterpillar-associated illness at a Boy Scout camp in New Mexico during July 2000.
Methods: A case was defined as onset of rash, itch, or hives during the week of camp. To identify case-patients and determine risk factors for illness, we administered a questionnaire to the 125 persons who were present at the camp during July 16–22. The U.S. Forest Service assisted with an environmental assessment.

Results: A total of 56 (55%) of 102 respondents met the case definition. The most common complaints were itch (96%), rash (85%), and hives (33%). Onset of illness occurred after a mean of 2.2 days in camp, and lasted a median of 5 days (range: 0–25). Medical care was sought by 59% of case-patients, but no one was hospitalized. Case-patients were more likely to report direct contact with a caterpillar (relative risk [RR]: undefined; Fisher's exact test significance=0.006); sleeping at campsite 6 (RR=1.7; 95% confidence interval [CI]=1.3–2.4); or a history of eczema (RR=1.9; CI=1.6–2.4). The caterpillars were identified as those of the Douglas-fir tussock moth (*Orgyia pseudogata*). Caterpillar density varied at the camp, but was highest at campsite 6.
Conclusions: This outbreak was caused by exposure to *O. pseudogata* caterpillars. Because *O. pseudogata* outbreaks typically last several years, options for use of the facility include limiting access when caterpillars are numerous, avoidance of behaviors associated with disease, and using insecticides to reduce the caterpillar population.

Key words: contact dermatitis, disease outbreaks, Lepidoptera, moths, urticaria

11:50 ***Michael A. Buley, P. Quinlisk, A. Dannenberg, R. Currier, C. Lohff, T. Török***
Predictors of Injury Among Bicyclists in a Recreational Long Distance Bicycle Tour — Iowa, 2000

Background: The July 2000 *Des Moines Register*'s Annual Great Bicycle Ride Across Iowa (RAGBRAI) bicycle tour, the largest of 40 such events across the country, drew 8500 weeklong riders to ride 490 miles over 7 days. Injuries, including fatalities, have been reported in previous years but have not been systematically evaluated. We conducted a retrospective study to assess the incidence of and risk factors for bicycling injury.
Methods: After the ride, an electronic mail message and three reminders were sent to 5200 email addresses provided by registered riders, directing recipients to a website to complete a survey of pre-event preparations and injury experience on RAGBRAI.
Results: A total of 1830 persons completed surveys. Based on median values of responses, the "typical" respondent was 46 years old (range 5–82), started training before April (51%), rode 26–50 miles per week (44%), had been riding for 7–15 years (31%), and averaged 1000–2499 miles per year (44%). The 1830 riders reported 182 crashes (23.6 per 100,000 person-miles) and 367 "near misses" (47.6 per 100,000 person-miles); 64 people (8.3 per 100,000 person-miles) reported receiving treatment for injuries sustained in crashes. Crashes and near misses were associated with having less than 7 years bicycling experience (RR=1.59, 95% Confidence Interval 1.21–2.10). "Road surface conditions" (24.3%) and "another cyclist stopped on or suddenly entering course" (22.9%) were the most frequently reported contributing factors in crashes or near misses.
Conclusions: The incidence of crashes and associated injuries was low, but was elevated among less experienced riders. Bicycling etiquette and safety education directed at less experienced riders, and careful course selection to avoid road hazards may be reasonable means for organizers to reduce injury rates.

Key words: bicycling; recreation; risk factors; wounds and injuries

Monday–Tuesday Poster Session

12:30 Poster Session No. 1 — Posters on Display

Food-borne Diseases

P1. ***Pia D.M. MacDonald, J. Boggs, R. Whitwam, M. Beatty, S. Hunter, N. MacCormack, L. Hale, S. Kahn, J-M. Maillard***

Listeria-Associated Birth Complications Linked With Homemade Mexican-style Cheese — Winston-Salem, North Carolina, 2000

Background: Infection with *Listeria monocytogenes* during pregnancy can precipitate stillbirths, spontaneous miscarriages, premature births, and serious newborn infections. We investigated an outbreak of *L. monocytogenes* serotype 4b in North Carolina. Health-care practitioners were alerted when three Hispanic patients were diagnosed with listeriosis within a 2-week period.
Methods: Case-patients were reported by two Winston-Salem hospitals. We conducted a matched case-control study with a case defined by illness with *L. monocytogenes* isolated from a normally sterile site in a female Winston-Salem resident during October 24 – December 9, 2000. Patients were matched by pregnancy status and age with three to four controls. Controls were Hispanic Winston-Salem residents selected from the county's maternity patient list or Women, Infants, and Children clinic.
Results: We identified 10 cases among females; nine were culture confirmed. All case-patients were Hispanic, Winston-Salem residents aged 18 – 28 years. Case-patients were more likely to have eaten fresh cheese sold door-to-door (odds ratio [OR] =16.7, 95% confidence interval [CI]=1.9, 145.3), eaten one specific fresh cheese (OR=12.5, 95% CI=1.5, 107.6), and bought food at store A (OR=5.4, 95% CI=1.1, 27.7). Patients reported that the cheese was unlabelled, which suggests that it was homemade. Isolates from seven patients, samples of cheese sold door-to-door and at small markets, and unpasteurized milk from a local dairy farm matched using pulsed-field gel electrophoresis.
Conclusions: This outbreak was linked to consumption of noncommercial, probably homemade, Mexican-style cheese produced from contaminated milk illicitly sold from a local farm. We recommend improving education for pregnant Hispanic women regarding the hazards of consuming unpasteurized fresh cheese, as well as enforcement of and compliance with laws prohibiting sale of raw milk.

Key words: *Listeria*, disease outbreaks, pregnancy, Hispanic, transmission, food microbiology

P2. ***Elizabeth A. Bancroft, I. Lee, L. Yasuda, E. Lehnkering, M. Tormey, L. Borenstein, L. Mascola***

Outbreak of Norwalk-Like Virus Associated With Foodhandlers: Using New DNA Primers to Detect Duration of Viral Shedding — Los Angeles, 2000

Background: Norwalk-like viruses (NLV) are the most common cause of foodborne illness in the United States and can be transmitted by foodhandlers. Current recommendations are to exclude foodhandlers from work for 2–3 days post resolution of gastrointestinal symptoms (PROS). In April 2000, we investigated a restaurant-associated outbreak of NLV. We studied the duration of NLV shedding in the stools of restaurant employees with newly introduced Region B reverse transcriptase-polymerase chain reaction (RT-PCR) primers.
Methods: Employees of restaurant A were questioned about the presence and duration of gastrointestinal symptoms, and their work schedules, for the last 2 weeks of March 2000. A case of gastroenteritis was defined as diarrhea ($\geq$3 loose stools per 24 hours), or nausea and/or vomiting plus two other symptoms (headache, myalgia, chills, cramps, fatigue). Persons with mild gastrointestinal symptoms not meeting the case defintion were considered suspect case-patients. Persons without gastrointestinal symptoms were considered asymptomatic. Stools were tested for NLV with Region B RT-PCR primers.
Results: All 71 restaurant employees were questioned: 31 (44%) met the case definition, 4 (6%) were suspect case-patients, and 36 (51%) were asymptomatic. Of 24 stools collected from case-patients, 13 (54%) were

positive for NLV. Stools from the 4 suspect case-patients were negative. Of 20 stools from asymptomatic persons, 4 (20%) were positive. Nine (75%) of 12 stools tested ≥4 days PROS were positive. Sixteen (50%) of 32 responding employees with any gastrointestinal symptoms admitted to working while ill.
Conclusions: With Region B primers, NLV could regularly be detected ≥4 days PROS, and 50% of restaurant employees admitted to working while ill. These results underscore the need to consider stricter work exclusion policies for symptomatic foodhandlers.

Key words: Norwalk virus, reverse transcriptase-polymerase chain reaction, disease outbreaks, gastroenteritis

P3. ***Susan H. Wootton, S. Kramer, R. Manning, S. Lance-Parker***
Staphylococcal Food Intoxication Associated with Eating Pork Barbecue — Georgia, 2000

Background: Since 1994, the Georgia Division of Public Health had investigated eight foodborne illness outbreaks associated with eating pork barbecue (PBBQ), which included 687 cases of gastrointestinal illness and 52 hospitalizations. In September 2000, the ninth PBBQ outbreak occurred in north Georgia. We investigated this outbreak to identify the cause of this event and means of preventing future outbreaks.
Methods: We administered a telephone questionnaire to luncheon attendees. A case was defined as diarrhea, vomiting, or cramps in a luncheon attendee starting ≤12 hours after the luncheon. Stool specimens from ill attendees and leftover food samples were collected for culture; pulsed field electrophoresis (PFGE) was performed on bacterial isolates.
Results: Of ~600 luncheon attendees, 172 completed the questionnaire; 86 met the case definition. All case-patients and controls had eaten PBBQ. The mean incubation period was 2.75 hours. Duration of illness ranged from 2 hours to 5 days. Common symptoms included diarrhea (87%), nausea (82%), cramps (72%), and vomiting (77%). Enterotoxin-producing *Staphylococcus aureus* was isolated from two of seven stool specimens and three of five PBBQ samples. PFGE patterns from all five isolates were identical. The amount of pork prepared for the luncheon was greater than that prepared by the restaurant daily. Restaurant inspection revealed temperature-control problems during the handling of the pork.
Conclusions: PBBQ was linked to the illness among attendees through identification of identical PFGE patterns in *S. aureus* isolates from stool and PBBQ samples. Barbecue preparation is risky because of potential temperature-control difficulties during the lengthy preparation time. Food handlers should be alerted to this increased risk and take special precautions when preparing large amounts of barbecue.

Key words: food contamination, staphylococcal food poisoning, Georgia, disease outbreaks

P4. ***Joseph F. Perz, T. Jones, A. Craig, J. Rowland, R. Fankhauser, S. Monroe, W. Schaffner***
A Large Gastroenteritis Outbreak Caused by Norwalk-like Virus from a Salad Bar — Nashville, Tennessee, 2000

Background: Evidence suggests that Norwalk-like viruses (NLV) are the leading cause of foodborne illnesses in the United States. In February 2000, a large ongoing restaurant-associated NLV outbreak was detected in Nashville, Tennessee.
Methods: The restaurant was closed for two days. We conducted epidemiologic and environmental investigations, including a cohort study of restaurant patrons identified from reservation lists, and tested stool specimens for enteric pathogens. Case-patients were restaurant patrons who ate a single meal during February 4–7, with onset of nausea, vomiting, or diarrhea within three days.
Results: Approximately 800 restaurant-associated illnesses were estimated, implicating meals served on six consecutive days. Twelve of 13 stool specimens were positive for NLV by reverse transcriptase polymerase chain reaction. Among the reservations cohort study of 130 patrons, 50 cases occurred. The median incubation was 37 hours, and the predominant symptoms were nausea (92%), diarrhea (78%), abdominal cramps (64%), headache (60%) and vomiting (52%). The attack rate was 42% (50/118) among those who ate items from the salad bar versus 0% (0/12) among those who did not (relative risk undefined, p=0.003); salad bar exposure could explain 100% of cases. The salad bar featured approximately 60 individual items; partial replenishment,

storage, and reuse were practiced. Several salad bar items were associated with illness in a stepwise logistic regression analysis, but none could explain >50% of the cases, suggesting sporadic contamination of multiple items. Illnesses compatible with NLV occurred among some restaurant employees before the outbreak.
Conclusions: This large gastroenteritis outbreak highlighted the potential of salad bars to cause prolonged transmission of NLV, demonstrating the need for standard operating procedures to minimize contamination of salad bars.

Key words: Caliciviridae Infections, Disease Transmission, Gastroenteritis/virology, Norwalk Virus, Restaurants, Reverse Transcriptase Polymerase Chain Reaction

P5. ***Donita R. Croft, R. Schroeder, M. Proctor, J. Davis***
***Escherichia coli* O157:H7 Outbreak Associated with a Self-Service Food Bar in an Elementary School — Wisconsin, 2000**

Background: Although *Escherichia coli* O157:H7 caused an estimated 14,000 infections among children aged 5–12 years in the United States in 1999, little is known about the transmission of these infections in schools. In October 2000, we investigated an *E. coli* O157:H7 outbreak in an elementary school during which four students were hospitalized, three with hemolytic uremic syndrome (HUS).
Methods: We defined a confirmed case as diarrhea with nausea, vomiting, or abdominal cramps during October in a student with confirmed *E. coli* O157:H7 infection or postdiarrhea HUS. We conducted a case-control study using randomly selected classroom controls and a telephone questionnaire to obtain food and activity histories. We interviewed school lunch employees and inspected the food preparation and serving areas. Pulsed-field gel electrophoresis (PFGE) was performed on all *E. coli* O157:H7 isolates from stool cultures.
Results: Among 483 school students, 16 (3%) had confirmed cases with illness onset during October 20–23. All students with confirmed cases and 39 (58%) of 67 controls ate hot lunches and used a self-service food bar on October 18. Brownies served October 18 were associated with illness (odds ratio=5.63, 95% confidence interval=1.04–40.39); no brownies were available for testing. The stool cultures of school lunch employees were negative for *E. coli* O157:H7. One student who was the likely source case-patient used the food bar while ill, had illness onset 8 days before other students, and an *E. coli* O157:H7 PFGE pattern indistinguishable from other case isolates.
Conclusions: Our investigation indicates that an ill student transmitted *E. coli* O157:H7 through a self-service food bar. Given the potential for contamination, the use of food bars by young students may be a risky practice.

Key words: diarrhea, disease outbreaks, *Escherichia coli* O157:H7, food handling, school

Surveillance: The Foundation of Public Health

P6. ***Homa Keshavarz, S. Hillis, B. Kieke***
Hysterectomy Surveillance — United States, 1994–1998

Background: Hysterectomy is one of the most frequently performed operations for women of reproductive age in the United States and is the most common nonpregnancy-related surgery for women of all ages. We evaluated recent trends in hysterectomy rates in the United States.
Methods: National Hospital Discharge Survey data for 1994–1998 were collected from a probability sample of inpatient discharge records from nonfederal short-stay hospitals in the United States. Overall and annual hysterectomy rates were computed per 1,000 females aged $\geq$15 years in the US civilian resident population.
Results: Hysterectomy rates increased significantly from 5.10 in 1994 to 5.78 in 1998 (p for trend=.04). The overall hysterectomy rate was 5.45 (95% confidence interval [CI] = 5.01– 5.88). Black women had the highest overall rate (6.27). The overall hysterectomy rate for women aged 40–44 years was 11.71 (95% CI = 10.70–12.72), which is significantly higher than for all other age groups. The overall rate for the South (6.52, 95% CI=5.54–7.51) was significantly higher than rate for the Northeast and West. The diagnosis most commonly associated with hysterectomies was uterine leiomyoma. Fifty-five percent of hysterectomies were

accompanied by bilateral oopherectomies, with 38% of hysterectomies with oopherectomies being performed on women aged 15–44 years. The percentage of laparoscopically assisted vaginal hysterectomy (LAVH) increased almost twofold from 13% in 1994 to 25% in 1998 (p for trend <.01).
Conclusions: Rates of hysterectomy, particularly LAVH, increased significantly during the years 1994–1998 and rates were highest among women aged 40–44 years, black women, and women living in the South. Research is needed to examine the causes of these increased rates of hysterectomy.

Key words: hysterectomy, surveillance, laparoscopy, vaginal, abdominal.

P7. ***Marc G. Weisskopf, P. Remington, H. Anderson***
Quality of Birth Certificate Data on Tobacco and Alcohol Use During Pregnancy — Great Lakes Region, United States, 1989–1995

Background: Maternal tobacco and alcohol use during pregnancy is associated with several adverse reproductive outcomes, including low birth weight and fetal alcohol syndrome. Birth certificate data are used to assess population trends in maternal and perinatal health. Questions about tobacco and alcohol use during pregnancy were added to most U.S. birth certificates in 1989, but few studies have examined the quality of these data, particularly for alcohol use. We examined the completeness of ascertainment of birth certificate data and survey responses in a cohort of women from the Great Lakes region.
Methods: As part of a larger study on environmental contaminant exposure, women from Wisconsin, Michigan, Indiana, Ohio, and Illinois were surveyed by telephone about their tobacco and alcohol use during pregnancy. We matched birth certificates to the children (n=278) of 221 of these women and compared these data with survey responses. The Sekar/Deming method was used to estimate completeness of ascertainment.
Results: Survey responses indicated tobacco and alcohol use during 16.9% and 11.5% of all pregnancies, respectively. Completeness of ascertainment for tobacco use was estimated to be 66.7% and 90.5% by birth certificates and survey responses, respectively. Completeness of ascertainment for alcohol use was estimated to be 2.9% and 14.3% by birth certificates and survey responses, respectively.
Conclusions: We found birth certificate data to underestimate both tobacco and alcohol use during pregnancy. Our findings for completeness of data on tobacco use from these sources are similar to other studies. Our findings for alcohol use, although the numbers are small, suggest that birth certificates may be so inaccurate for alcohol use during pregnancy that they have limited use as a data source.

Key words: alcohol drinking, birth certificates, pregnancy, smoking, tobacco, validity of results

P8. ***Matthew R. Moore, M. Gamble, E. Zell, C. Whitney for the Active Bacterial Core Surveillance***
Estimating Deaths Due to *Streptococcus pneumoniae* — United States, 1996–1998

Background: In the United States, *Streptococcus pneumoniae* causes more deaths than any other vaccine-preventable bacterial infection. Projections from CDD's Active Bacterial Core Surveillance (ABCs) suggest that 6,100 invasive pneumococcal disease (IPD) deaths occurred in the U.S. in 1998. Precise pneumococcal mortality estimates are useful for developing and monitoring pneumococcal vaccine strategies. We determined the accuracy of ABCs IPD mortality estimates.
Methods: We compared IPD deaths detected by ABCs to deaths identified by the National Vital Statistics System (NVSS) during 1996–1998 in the 57 ABCs counties. ABCs defines a case of IPD by the isolation of pneumococcus from a normally sterile site in a surveillance area resident. We detected IPD deaths in NVSS if death records included any one of four IPD-specific diagnostic codes. To evaluate ABCs sensitivity, we used capture-recapture methodology to compare all ABCs reports, regardless of outcome, with NVSS deaths carrying any invasive or noninvasive (e.g., pneumonia) pneumococcal code.
Results: From 1996 through 1998, ABCs detected 1,142 IPD deaths, and NVSS detected 171. Eighty-eight of these IPD deaths were captured by both systems; 994 deaths were missed by both systems, yielding a total of 2,219 deaths. The sensitivity of ABCs was 52 percent (1,142/2,219). Of 83 deaths captured only by NVSS, 39 matched ABCs cases recorded as alive. Of 1,054 deaths identified only by ABCs, 142 matched NVSS

deaths that were assigned noninvasive diagnostic codes. We identified 650 additional matches using alive ABCs cases and noninvasive pneumococcal deaths.
Conclusions: Using a rigorous case definition of IPD death, ABCs captured half of all deaths. Many of the deaths that ABCs "missed" were ABCs cases recorded as alive or NVSS cases assigned noninvasive ICD9

P9. ***Anil A. Panackal, N. M'ikanatha, B. Dixon, J. McMahon, R. Tsui, M. Wagner, J. Zubieta, M. Phelan, J. Morgan, D. Jernigan, A. Pasculle, J. Rankin, R. Hajjeh, and L. Harrison***
Evaluation of Electronic Laboratory-based Reporting of Notifiable Infectious Diseases at a Large Health System — Allegheny County, Pennsylvania, 2000

Background: Infectious disease surveillance is crucial to quickly identify and respond to outbreaks and potential bioterrorism threats. The University of Pittsburgh Medical Center Health System (UPMC HS) has established electronic laboratory-based reporting (ELR), using a national communications standard (HL7), to improve reporting of infectious diseases to the Allegheny County (population: 1,348,000) Health Department (ACHD). However, validation of ELR is necessary before it can be integrated into conventional reporting (CR).

Methods: We reviewed reports of 10 laboratory-diagnosed infectious diseases from 8 UPMC HS hospitals that were reportable to ACHD during January 1–November 26, 2000. We determined timeliness of both systems, and estimated completeness of reporting using a capture-recapture method.
Results: A total of 69 reports were sent through both ELR and CR, 25 through CR only, and 47 through ELR only (10 of these 47 were found not to be notifiable upon subsequent investigation). For the 69 reports received through both systems, electronic reports were received a median of 4 days (interquartile range: 4) earlier than conventional reports. The estimated overall completeness of reporting was 74% (95% confidence interval [CI] = 66–81%) for ELR and 65% (95% CI = 57–73%) for CR (p>0.05). However, ELR included only laboratory reports whereas CR represented reports from both laboratories and clinicians. Most (88%) reports missed by ELR were due to data entry errors.
Conclusions: Automated reporting using existing hospital communications infrastructure was more timely and as complete as conventional reporting. Minimizing data entry errors will increase completeness of reporting through ELR. With broader implementation, ELR should substantially improve completeness and timeliness of public health response and will help achieve objectives for CDC's National Electronic Disease Surveillance System (NEDSS).

Key words: bioterrorism, electronic laboratory-based reporting, HL7, capture-recapture method, National Electronic Disease Surveillance System

P10. ***Richard F. Leman, J. Bertolli, J. Cheek***
Completeness of Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome Reporting Among American Indians — New Mexico, 1980–2000

Background: Rates of human immunodeficiency virus (HIV) infection and acquired immunodeficiency syndrome (AIDS) among American Indians (AIs) are reportedly below those for the general population, yet rates of other sexually transmitted diseases (STDs), calculated from data in 14 western states, are higher — 58% higher for syphilis and 2.5 times the national average for *Chlamydia*. These findings suggest that HIV/AIDS reporting among AIs is incomplete.
Methods: Using all HIV/AIDS-associated *International Classification of Disease, Ninth Revision-CM* codes, we conducted an electronic search of Indian Health Service (IHS) and tribal facilities within IHS's Albuquerque Service Area (ASA) and in New Mexico to identify all possible cases of HIV/AIDS diagnosed during 1980–2000. Identified patients were hand-matched by name and birthdate with the HIV/AIDS surveillance database of New Mexico's Department of Health (NMDOH). We reviewed charts for IHS patients not found in NMDOH's database. Reasons for nonreporting were determined.
Results: Initial matching identified 27 (27%) of 101 found through the IHS search who were not reported to NMDOH. Record reviews revealed that eleven (41%) HIV-negative patients were miscoded as HIV positive,

as were five (18%) with no evidence of HIV disease or testing in their charts. Four (15%) were nonresidents, two (7%) were not reportable by criteria extant when last seen, and two (7%) were reportable. Three charts were unavailable. Forty-seven (39%) of 121 AIs in NMDOH's database and living within the ASA were not found in IHS databases.
Conclusions: Although HIV/AIDS reporting for AIs was hypothesized to be incomplete, we found only two unreported cases from IHS facilities. Differences between HIV and STD rates among AIs in New Mexico cannot be explained by incomplete reporting.

Key words: acquired immunodeficiency syndrome, epidemiology, HIV-1, North American Indians

Health Hazards Among Injecting Drug Users and Prisoners

P11. *Vu M. Quan, A. Chung, R. Steketee, T. Dondero*
Rapid Evolution of HIV Among Injection Drug Users — Vietnam, 1996–1999

Background: In Vietnam, 88% of human immunodeficiency virus (HIV) infections have been acquired through injection drug use. To better understand the evolution of the epidemic, we examined HIV seroprevalence data for 1996–1999 on injection drug users (IDUs).
Methods: Annually, seroprevalence surveys are conducted in 21 sentinel provinces (9 northern and 12 southern). Blood specimens were collected sequentially from the first 400 IDUs entering drug treatment centers in each province and tested for HIV antibody. We used the chi-square test for linear trend to assess temporal trends in annual seroprevalence rates in each province and used linear regression to examine correlates of level of change.
Results: In 1996, in the northern provinces, prevalence was low (median, 0.05%; range, 0%–9.2%). In the south, prevalence was high in six provinces (median, 32.9%; range, 23.3%–50.8%) and low in six others (median, 3.1%; range, 0%–6.5%). By 1999, prevalence was very high in two northern provinces (64.0% and 64.9%) and significantly increasing in five other provinces ($p \leq 0.01$). Among southern provinces where prevalence was high in 1996, prevalence continued to increase significantly ($p<0.01$) in three (up to 89.4%) and remained high in others (range, 16.3%–48.8%). In four of six southern provinces where prevalence was lower in 1996, prevalence increased significantly by 1999 (5.6%–37.5%; $p<0.05$). According to regression analysis, level of change during 1996–1999 was not associated with 1996 prevalence ($p=0.84$).
Conclusions: HIV prevalence has increased quickly among IDUs at most surveillance sites. The surveillance system was useful in detecting trends, but the 1996 prevalence did not help predict changes. Intensive interventions are urgently needed to reduce HIV transmission among Vietnam's IDUs.

Key words: HIV, surveillance, prevalence, trends, Vietnam, Asia

P12. *Stephanie R. Bialek, W. Bower, A. Paul-Ward, K. Mottram, C. Miron, I. Williams, B. Bell*
Investigation of an Outbreak of Hepatitis B Among Injecting Drug Users — Pierce County, Washington, 2000

Background: Although recommended for injecting drug users (IDUs) since 1981, hepatitis B vaccine coverage remains low and hepatitis B outbreaks continue to occur. During January–May 2000, 16 hepatitis B cases were reported in Pierce County, Washington, compared with seven in all of 1999. Eleven (68.8%) case-patients were IDUs; three died of fulminant hepatitis.
Methods: We reviewed laboratory results, contacted physicians, and conducted a cross-sectional serologic survey among IDUs to identify additional cases of hepatitis B virus (HBV) infection. We conducted a case-control study of risk factors for infection by comparing IDU case-patients identified during January–May 2000 with HBV-susceptible IDUs identified in the serologic survey. To control the outbreak, we implemented vaccination clinics at local needle-exchange programs and the jail.
Results: Fifty-nine cases were identified during January–October 2000; 34 (2.9%) from the 1183 serologic survey participants and 25 from health department reports. Forty-three case-patients (72.9%) were IDUs. Case-

patients were more likely than control-patients to report having >1 sex partner (70.6% vs. 33.8%, odds ratio (OR) 4.69, 95% confidence interval (CI) 1.41, 17.89), injecting >4 times/day (35.3% vs. 9.9%, OR 4.95, 95% CI 1.27, 17.52) and sharing drug cookers (88.2% vs. 56.8%, OR 5.70, 95% CI 1.24, 52.89). Although more case-patients than control-patients reported needle sharing (50.0% vs. 30.3%), the difference was not significant (OR 2.57, 95% CI 0.69, 7.54). Results were similar after controlling for needle sharing in multivariate analysis. Over 1900 high-risk adults received $\geq$ 1 dose of hepatitis B vaccine during May–December 2000.
Conclusions: HBV transmission among IDUs was associated with sharing drug cookers, independent of needle sharing. Vaccine programs for IDUs should be strengthened, and IDUs should be advised against sharing drug paraphernalia.

Key words: hepatitis B, fulminant hepatitis, injection drug use

P13. ***Kristy O. Murray, M. Fischer, D. O'Flanagan, J. Lingappa, G. Sayers, J. Tappero, C. Bergin, E. Keenan, D. Igoe, L. Mullen, S. Reagan, A. Smith, J. Barry***
Outbreak of Unexplained Death and Illness Among Injecting-Drug Users — Dublin, Ireland, 2000

Background: On May 25, 2000, public health authorities in Dublin, Ireland, identified a cluster of unexplained severe illnesses among injecting drug users (IDUs). Similar clusters were also reported in Scotland and England. Concurrent investigations were undertaken to identify the etiology and source of the illnesses.
Methods: A case was defined as extensive soft tissue inflammation at an injection site in an IDU presenting to hospital in Ireland after April 1, 2000. Active surveillance was initiated in Dublin emergency departments and coroners' offices. Investigation of case-patients included medical record review and patient or surrogate interviews. Diagnostic specimens were sent to local microbiology laboratories, CDC and the U.K. Public Health Laboratory Service for testing.
Results: Between April 1 and August 31, 22 IDUs were identified in Dublin with injection-site inflammation resulting in hospitalization or death; 8 (36%) died. Median age was 30 years (range: 19–51 years); 14 (64%) were male. Among 10 patients with severe systemic symptoms, the median white blood cell count was 35,000 (range: 2,800–96,000). Eighteen (82%) patients reported injecting heroin intramuscularly in the 2 weeks before illness, and 12 (55%) linked a purchase of heroin to a common supplier. Of 8 patients from Dublin with adequate specimens available for testing, 2 (25%) were positive by anaerobic culture and/or 16s rDNA PCR for *Clostridium novyi*.
Conclusions: Injection-site inflammation, leukemoid reaction and cardiogenic shock found in these case-patients are characteristic of toxin-mediated infections. The findings of this investigation support pathogenic clostridia as the likely cause of this cluster of illnesses and deaths in IDUs. As a result, empiric treatment for infections among IDUs was optimized to cover anaerobic organisms, and outbreak publicity led to an increased demand for methadone treatment in Dublin.

Key words: Ireland, unexplained illness, heroin, *Clostridium novyi*

P14. ***David B. Callahan, P. Gonzales, P. Murray, R. Gunn***
Hepatitis C Seroprevalence Among Participants in a Court-Mandated Drug Rehabilitation Program — San Diego County, California, 1999–2000

Background: Hepatitis C virus (HCV), a common bloodborne pathogen, leads to cirrhosis among 10–15% of infected persons. Behavioral and medical interventions can prevent long-term sequelae of HCV infection and reduce the risk for transmission to others, but early HCV infection can be asymptomatic. Screening can identify HCV-infected persons and guide population-specific interventions.
Methods: Since December 1999, participants in a court-mandated drug rehabilitation program have been offered HCV testing and asked to complete risk-assessment questionnaires. We linked testing and questionnaire results and calculated risk factor-specific HCV infection prevalence ratios.

Results: Of ~270 clients, 217 (80%) accepted testing; 39 (18%) tested HCV positive. Risk factor information was available for 156 clients. Of 59 self-reported injection drug users (IDUs), 27 (46%) tested HCV positive, compared with 5 (5%) of 97 clients denying injection drug use (prevalence ratio [PR]=8.9; 95% confidence interval [CI]=3.6–21.8). IDUs aged >30 years were more likely to be HCV positive than younger IDUs (61% [22/36] versus 22% [5/23]; PR=2.8; 95% CI=1.2–6.3), and IDUs with a history of trading sex for money or drugs were more likely to be HCV positive than IDUs without this history (75% [6/8] versus 40% [14/35]; PR=1.9; 95% CI=1.1–3.3). Non-IDUs who had received blood transfusions were more likely to be HCV positive than non-IDUs who had not (14% [1/7] versus 1% [1/69]; PR=9.9; 95% CI=0.7–141). No other potential risk factors were associated with HCV positivity.
Conclusions: HCV seroprevalence was high among program clients. Prevention should focus on reducing injection drug-related HCV transmission, particularly among younger IDUs who are less likely to have acquired HCV, and preventing long-term sequelae among those already infected.

Key words: hepatitis C/epidemiology, hepatitis C/prevalence, hepatitis C, chronic/prevention and control, hepatitis C/risk factors, substance abuse

P15. ***Bruno P. Coignard, R. Nolan, S. McAllister, A. Kennedy, N. Labiano-Abello, R. Culpepper, S. Holt, M. Kellum, M. Kuehnert, S. Fridkin, and the MRSA Prison Study Team***
An Outbreak of Methicillin-Resistant *Staphylococcus aureus* Infections in a Prison — Mississippi, 2000

Background: Methicillin-resistant *Staphylococcus aureus* (MRSA) has recently emerged as a community-acquired pathogen. On October 25, 2000, CDC was notified of a recent increase in MRSA skin infections at a state prison (Prison A) with 3,000 inmates. Two million inmates are housed in United States correctional facilities; an MRSA outbreak has never been reported in this setting.
Methods: We reviewed medical records and interviewed inmates with an MRSA infection at Prison A from November 1999 through November 2000. Case-isolates were sent to CDC for confirmatory testing and genotyping. To assess the extent of MRSA colonization, we conducted a point-prevalence nasal culture survey of all females, and a one third random sample of males.
Results: Sixty-one cases (58 skin infections, and three otitis externa) were identified; 47 (77%) were females. Two had complications (sepsis, or osteomyelitis). Median age was 34 years. Median incarceration length before infection was 409 days (range: 3–5,627). Of 48 cases interviewed, 36 (75%) had not been hospitalized in the past year. The 39 available case-isolates were uniformly susceptible to gentamicin, rifampin, and chloramphenicol. By pulsed-field gel electrophoresis, 22/33 (66%) female case-isolates were similar; six male case-isolates were of five different genotypes. *S. aureus* colonization rates among females and males were 26.0% (322/1,237) and 30.3% (156/515), respectively (p=0.07). MRSA colonization rates among females and males were 6.2% (77/1,237) and 2.5% (13/515), respectively (p=0.001).
Conclusions: We documented an unexpectedly high MRSA colonization rate for a non-healthcare setting, and transmission of clonally related strains, particularly among females. Innovative interventions, guided by results of the case-control study that we also performed, will be needed to prevent further spread of MRSA in this newly identified setting.

Key words: Staphylococcus aureus, methicillin resistance, disease outbreak, prisoners, United States.

Monday Afternoon — April 23, 2001

1:30 Health Policy and Health Promotion. Moderator: Jennifer H. Madans

I:35 ***Meredith A. Reynolds, L. Schieve, G. Jeng***

Does Insurance Decrease Women's Risk for Multiple Births Associated with Assisted Reproductive Technology?

Background: Assisted reproductive technology (ART), including in vitro fertilization (IVF), is a risk factor for multiple births. Whether insurance coverage for ART influences patients' decisions regarding how many embryos to transfer, a predictor of multiple-birth, has not been investigated; however, many infertility specialists and advocacy groups argue that lack of insurance fosters the transfer of more embryos. Understanding this relationship is important because 15,307 (58%) of the 26,446 infants born as a result of ART procedures in the United States during 1998 were born in multiple-birth deliveries. Twins are five times as likely as singleton infants to die during the first year of life, and triplet and higher-order infants are 13 times as likely to die.
Methods: U.S. population-based data on ART procedures initiated in 1998 were used to 1) investigate the contribution of ART to the total number of triplet and higher-order multiple births and 2) compare the number of embryos transferred and ART multiple-birth rates between three states with mandated ART insurance coverage and three states without coverage.
Results: In 1998, 48.7% of infants born in triplet and higher-order deliveries in the United States were conceived by ART. Among women aged $\leq$ 35 years, those who underwent IVF in states with mandated ART insurance coverage did not choose to have fewer embryos transferred than those who underwent IVF in states without mandated coverage. Insurance coverage also was unrelated to multiple-birth rates, which were 38%–50% in states with mandated coverage and 41%–43% in states without such coverage.
Conclusions: Preliminary results suggest that mandated ART insurance coverage is not associated with decreased multiple-birth risk for women aged $\leq$ 35 years undergoing IVF.

Key words: fertilization in vitro; embryo transfer; multiple birth offspring; pregnancy, multiple

1:55 ***Julia C. Rhodes, W. Barfield, M. Kohn, K. Hedberg, K. Schoendorf***
An Evaluation of Releasing Pre-Adoption Birth Records to Adoptees — Oregon, 2000

Background: On June 2nd, 2000 the Oregon Health Division implemented a citizen initiated ballot measure that grants adult adoptees access to their sealed birth records. Like birth certificates, these records contain birth parents' names, but no medical information. Evaluation of this practice is important because 46 states currently restrict adoptees' access to birth records, and several are considering legislation similar to Oregon's new law.

Methods: An 8% random sample of the 2529 adoptees who requested and received their records by July 20, 2000 was selected for a telephone survey designed to describe this population, their motivations and expectations, and their perceived usefulness of the information.
Results: Of the sample of 209 eligible adoptees, 123 (59%) were interviewed, 84 (40%) could not be reached, and 2 (1%) refused. The mean age of the adoptees was 41 years, 64% were female, and nearly all (97%) were white. The most common reasons for requesting records were to find birth parents (29%), and to obtain medical information, (29%). All records listed a birth mother's name, but only 31% listed a father's name. Thirty-three (47%) of the 70 adoptees who tried to find their birth mother were successful. Twenty-nine percent of adoptees received less information than they expected, with many expecting information about their birth father. Fifty-two percent of the adoptees found the records "very" useful, 42% "somewhat" or "a little" useful, and 6% "not at all" useful.
Conclusions: Policy makers, supporters and opponents should realize that many adoptees who obtain their birth records do not meet their goals of establishing relationships with or obtaining medical information from their birth parents. Nonetheless the majority of adoptees find the record useful.

Key words: birth certificates, adoption, legislation, patient access to records

2:15 ***Idalia M. González, P. Kramarz, F. Averhoff, M. Massoudi, F. DeStefano, H. Yusuf, Vaccine Safety Datalink Team***

Implementation of Hepatitis B Vaccination Recommendations in Adolescents in Three Health Maintenance Organizations — United States, 1995–1998

Background: Failure to vaccinate a 1-year birth cohort of 4 million US adolescents with hepatitis B vaccine (HepB) will result in an estimated lifetime burden of 10,000 chronic hepatitis B virus (HBV) infections and 1,400 deaths. Because more than 70% of HBV infections are acquired among adolescents and young adults, in 1994 the Advisory Committee on Immunization Practices (ACIP) recommended routine vaccination of 11- to 12- year-olds with 3 doses of HepB. We evaluated vaccination rates among adolescents to determine how well the ACIP recommendation has been implemented.
Methods: We conducted a retrospective cohort analysis of all 13-year-old children who were continuously enrolled from 1995 to 1998 in the three health maintenance organizations (HMOs) that participated in CDC's Vaccine Safety Datalink computerized surveillance system. We determined 1) the percentage who had received three doses of HepB in 1995 and 1998, and 2) demographic factors associated with vaccination. HepB was a covered benefit for adolescents in these HMOs.
Results: The mean cohort sizes were 21,260 in HMO A, 3,309 in HMO B, and 2,517 in HMO C. Between 1995 and 1998, the percentage of 13-year-olds who had received 3 doses of HepB increased from 19.9% to 43.4%, 49.2% to 65.5%, and 0.7% to 25.7% in HMOs A, B, and C, respectively. Race/ethnicity distributions differed among HMOs (non-Hispanic white were >90% of all adolescents in HMO B and C and 40% in HMO A); receipt of HepB did not differ by race/ethnicity or gender.
Conclusions: Even when access and cost were not barriers to vaccination, a large percentage of these adolescents remained unvaccinated. Achieving the Healthy People 2010 goal of 90% vaccination rates among adolescents will require more effective strategies to improve vaccination rates among adolescents.

Key words: hepatitis B vaccine, adolescence, Health Maintenance Organizations, vaccination

2:35 *Reuben K. Varghese, C. Friedman, F. Ahmed, A. Franks*
Testing for Colorectal Cancer Among an Insured Population of a Midwestern Manufacturer — United States, 1993–1999

Background: Colorectal cancer (CRC) is the second leading cause of cancer-related deaths in the United States. The U.S. Preventive Services Task Force recommends CRC screening, beginning at age 50, yet the 1997 Behavioral Risk Factor Surveillance System findings indicated that only 29% of adults aged $\geq$ 50 years had a sigmoidoscopy within the past 5 years, and only 19% of adults aged $\geq$ 50 years had fecal occult blood testing (FOBT) within the past year. Although insured persons are more likely to receive preventive services than uninsured, information is lacking regarding delivery of preventive services among different insurance plans, including CRC screening.
Methods: Using linked health claims and personnel data from a self-insured Midwestern manufacturer, rates of CRC testing were determined for adults aged 50–64 years during 1993–99.
Results: Among 284,697 persons eligible for CRC screening, 10% had received FOBT within the previous year and 7% had undergone sigmoidoscopy within the previous 5 years. In addition, 13% had undergone colonoscopy, and 2% had undergone air contrast barium enema within the previous 7 years. Preliminary analysis demonstrates that enrollees in preferred provider organization (PPO) plans were more likely to receive CRC testing than enrollees in fee-for-service (FFS) plans, particularly for FOBT (relative risk [RR] = 1.77; 95% confidence intervals [CI] = 1.73, 1.81).
Conclusions: Overall, rates for CRC testing were low among insured persons, especially enrollees in traditional FFS compared with PPO plans. Corporate purchasers should align health benefit packages and incentives for increasing CRC screening for employees. Substantial improvement will be necessary to approach the Healthy People 2010 objectives of 50% population coverage for both FOBT and sigmoidoscopy, even among insured persons.

Key words: colorectal cancer, screening, fee-for-service plans, preferred provider organizations

3:15 Emerging and Reemerging Health Threats. Moderator: James M. Hughes

3:20 ***Henry C. Baggett, T. Hennessy, R. Leman, C. Hamlin, D. Bruden, A. Reasonover, P. Martinez, J. Butler***

Outbreak of Community-Acquired Methicillin-resistant *Staphylococcus aureus* (MRSA) Skin Infections Among Alaska Natives — Southwestern Alaska, 2000

Background: Recent reports of MRSA infected patients without hospital exposure indicate that MRSA infection is now acquired in both healthcare and community settings. In August, 2000, an MRSA skin infection outbreak among patients without hospital exposure was reported in southwestern Alaska (population 20,000). We investigated the extent of community-acquired MRSA infections and potential risk factors for disease.
Methods: We reviewed charts of patients with a positive *S. aureus* culture at the regional hospital from March, 1999 through August, 2000. Community-acquired MRSA was defined as culture-confirmed illness in someone without hospitalization or surgery in the prior year. In one village, we conducted a case-control study comparing 34 patients with culture-confirmed *S. aureus* skin infection with 94 controls. We assessed sauna use and MRSA nasal carriage.
Results: From March, 1999 through June, 2000, the number of MRSA skin infections increased from five to 52 per month ($p<0.01$), and visits for skin infections increased from 1% to 3% of all outpatient visits ($p<0.01$). In the peak three months of the outbreak, 148 (85%) of 175 *S. aureus* skin infections were MRSA and 74% (110/148) of these met the definition of community-acquired illness. Case-patients received more antibiotic courses than controls in the year before the outbreak (median 3.5 vs. 2.0 courses, $p=0.02$) and were more likely than controls to have MRSA-colonized household members (OR=3.4, $p<0.01$). MRSA was cultured from 8 (17%) of 47 saunas; 44% of case-patients and 13% of controls used MRSA-positive saunas (OR=5.6, $p<0.01$).
Conclusions: In this outbreak of community-acquired MRSA skin infections among Alaska Natives, infection was associated with prior antibiotic use. Sauna use and household contacts were also implicated in disease transmission.

Key words: staphylococcal skin infection, methicillin resistance, community-acquired infection, antibiotics

3:40 ***Elizabeth A. Bancroft, T. Treadwell, K. Glynn, C. Peterson, L. Mascola***

Real-Time, Web-Based Syndromic Surveillance During the Democratic National Convention — Los Angeles, 2000

Background: High-profile gatherings of people might be targets for a bioterrorist (BT) attack. Effective response during a BT attack requires timely surveillance. From August 7 through August 22, 2000, around the time of the Democratic National Convention (DNC) in Los Angeles, we conducted novel web-based surveillance for seven syndromes that represent clinical manifestations of previously identified priority BT agents.
Methods: Hospital staff in 12 Los Angeles county emergency departments (ED) collected information about each patient visit (i.e. age, gender, time and date of admission to ED, connection to DNC, and syndrome) and were asked to promptly enter the data into a secure web site. Data were monitored hourly for syndrome reports and analyzed, at least once a day, using aberration detection methods. Selected statistically significant increases were further investigated. Report lag-times were calculated by subtracting the date and time of patient admission from the date and time of the electronic submission.
Results: During the 16-day surveillance period, 11,219 unique patient reports were received; 752 (6.7%) reported 1 of the 7 syndromes under surveillance, 9,239 (82.4%) reported illnesses not related to these syndromes, and 1,228 (10.9%) had no syndrome-related information. DNC-associated patients accounted for 141 (1.3%) of the reports. The overall report lag-time mean and median were 21.6 and 14.3 hours, respectively. Five statistically significant clusters of syndrome reports were investigated; none was identified as an outbreak or a BT event.

Conclusions: Syndromic surveillance using web-based technology was successfully implemented. Future goals include automating electronic data transfer, refining the aberration detection methods, and rapid deployment of the surveillance system during a BT attack.

Key words: population surveillance, biological warfare, communicable diseases, disease outbreaks

4:00 ***Chima J. Ohuabunwo, C. Vitek, S. Glissman, P. Gargiullo J. Perevoscikovs, A. Griskevica, A. Brila***

Outbreak of Diphtheria Among Highly Vaccinated Military Trainees — Riga, Latvia, 2000

Background: Diphtheria is a vaccine-preventable disease with a 5–10% mortality rate from myocarditis and airway obstruction. In 1994–1996, diphtheria reemerged in Latvia with 731 cases and 55 deaths. By 1997, cases fell to 42 after immunization campaigns but increased in 1999 to 81 despite high immunization coverage. In August 2000, an outbreak of diphtheria began at the Latvian military academy. We investigated the outbreak to determine its extent and risk factors for diphtheria.
Methods: We reviewed immunization histories, clinical and laboratory records of academy trainees and administered questionnaires to obtain data on risk factors. A diphtheria case was defined as membranous pharyngitis in a trainee, with or epidemiologically linked to a positive toxigenic *Corynebacterium diphtheriae* culture.
Results: Among 207 trainees, 45 (22%) met the case definition; all survived, only one had severe myocarditis. Another 79 (38%) trainees were carriers of toxigenic *C. diphtheriae*. Sharing cups was a risk factor for infection (RR=1.4, 95% Confidence Interval [CI]=1.1–1.8). Of 192 trainees with immunization records, 164 (85%) had $\geq$5 doses of diphtheria toxoid and 153 (80%) received their last dose 3–5 years before the outbreak. Shorter interval since last dose showed a protective trend (RR=0.66, 95% CI=0.38–1.2). The risk of disease was higher among trainees who received lower antigen toxoid (Td) as the last booster dose compared with those who received higher antigen toxoid (DT) (RR=2.8, 95% CI=1.5–5.1).
Conclusions: Outbreaks of mild diphtheria can occur among young adults living in close quarters, even if highly vaccinated. Strict hygienic measures may limit infection and recent vaccination may protect against disease. Receipt of DT for the adolescent/adult booster doses may provide greater protection than Td in diphtheria endemic areas.

Key words: respiratory diphtheria, disease outbreak, vaccine-preventable disease, membranous pharyngitis, diphtheria toxoid, myocarditis

4:20 ***Amita Gupta, S. Rossiter, J. McClellan, K. Stamey, T. Barrett, F. Angulo and the NARMS Working Group***

Fluoroquinolone-Resistant Campylobacter Infections in the United States, 1997-2000: National Antimicrobial Resistance Monitoring System's Data lead to Regulatory Action

Background: *Campylobacter* causes an estimated 2.4 million illnesses in the United States each year. Poultry is a common source of human *Campylobacter* infections. Fluoroquinolones (FQ), which are commonly used to treat *Campylobacter* infections in humans, were approved for use in poultry in 1995. We determined the prevalence of FQ resistance in *Campylobacter* isolates from poultry and ill humans, and explored risk factors for human infections.
Methods: State health departments participating in the National Antimicrobial Resistance Monitoring System (NARMS) for enteric bacteria submitted *Campylobacter* isolates from ill humans and grocery-store-purchased chicken to CDC. CDC performed FQ resistance testing using E-test. A random sample of patients with *Campylobacter* isolates in 1998–99 from participating NARMS sites were interviewed.
Results: From 1997 to 2000, 1003 human *Campylobacter* isolates were tested; 15% were FQ resistant. From 1998 to 1999, 180 poultry specimens were tested; *Campylobacter* was isolated from 80 (44%); strains from 19 (24%) were FQ resistant. Between 1998 and 1999, 213 patients were interviewed. FQ resistance was associated with international travel in the 7 days before illness onset (relative risk=4.43, 95% confidence

interval=2.19–8.94). Nevertheless, 64% (16 of 25) of persons with FQ-resistant infections did not travel outside the United States. Among non-travelers, 62% (10 of 16) with FQ-resistant and 64% (111 of 173) with FQ-susceptible *Campylobacter* infections ate poultry in the week before becoming ill.

Conclusions: FQ resistance among *Campylobacter* isolates from ill humans and grocery-store-purchased poultry is common. The majority of FQ-resistant infections in humans were acquired domestically. These and other data contributed to a recent Food and Drug Administration (FDA) risk assessment that concluded that FQ use in poultry is contributing to FQ-resistant *Campylobacter* infections in humans. Subsequently, in December 2000, FDA proposed withdrawing the use of FQ in chickens and turkeys.

Key words: Campylobacter, fluoroquinolones, antibiotic resistance, United States

4:40 *Scott Harper, W. Thompson, E. Weintraub, C. Bridges, N. Cox, K. Fukuda*
Projections of Influenza Mortality — United States, 2000–2030

Background: Influenza is a major cause of death in the United States. Most influenza-related mortality occurs in persons ≥65 years, a group that will substantially increase in numbers over the next 30 years. We estimated the projected increase in influenza-attributable deaths that will accompany the population growth in this age group.

Methods: U.S. census growth projections by 5-year age groups were obtained for the years 2000 through 2030. An annual average total number of deaths from all causes in the United States, and the percentage accounted for by the population ≥65 years, were calculated using vital statistics data for 1976–1997. A fraction of such "all-cause" deaths occurring during influenza seasons is attributable to influenza. A Poisson regression model was used to estimate the 1976–1997 annual average rate of influenza-attributable all-cause deaths among persons ≥65 years. This rate was applied to census growth projections to estimate future numbers of influenza-attributable deaths among persons ≥65 years.

Results: Among persons ≥65 years, overall numbers of all-cause deaths in 2000, 2015, and 2030 were projected to be 1,955,077 deaths, 2,550,051 deaths, and 3,935,566 deaths, while influenza-attributable all-cause deaths were projected to be 31,979 deaths, 42,190 deaths, and 64,553 deaths, respectively.

Conclusions: Substantial increases in influenza-attributable deaths will accompany the increased growth among the elderly. An increase in morbidity during influenza seasons can also be expected, which will exert tremendous pressure on health-care systems.

Key Words: influenza, mortality, model, census

Tuesday Morning — April 24, 2001

8:30 Worker Safety and Health. Moderator: Mitchell Singal

8:35 *Katherine A. Feldman, S. Lathrop, R. Enscore, B. Matyas, M. McGuill, S. Soliva, M. Schriefer, M. Chu, D. Stiles-Enos, T. LaPorte, D. Dennis, E. Hayes*
Lawnmower Tularemia — Martha's Vineyard, Massachusetts, 2000

Background: In the United States, primary pneumonic tularemia is rare and has a high untreated mortality. A cluster occurred on Martha's Vineyard (MV) in 1978, and several cases have been reported in persons who disturbed rabbit carcasses, including two children who mowed over a rabbit. In July 2000, five pneumonic tularemia case-patients were reported on MV, three of whom brush-cut or mowed lawns before illness.
Methods: Additional case-patients were sought through MV physicians and hospitals. A confirmed case was a MV resident or visitor at least 18 years old who developed laboratory-confirmed pneumonic tularemia after May 1, 2000. Case-control interviews and environmental studies were performed to identify risk factors for illness. Controls were enrolled through random digit dialing. We re-created mowing activities and collected grass, air, water and mammal samples to evaluate risk of airborne *Francisella tularensis*.
Results: Ten case-patients were identified; all were male and eight mowed lawns or brush-cut during the incubation period. One mowed over a rabbit. Virulent type A *F. tularensis* was isolated from lung tissue of the single fatality. Case-patients were more likely than controls to be landscapers (OR=32.0, 95% CI=[4.7, 257.2]); male (OR=undefined, 95% CI=[2.9, undefined]); have brush-cut or mowed (OR=9.2, 95% CI=[1.6, 68.0]); worked with bark-chips (OR=8.1, 95% CI=[1.2, 53.7]); and spent more time outdoors (8.4 vs. 5.2 average hours daily, p=0.01). Three trapped mammals were seropositive for *F. tularensis*.
Conclusions: This is the second reported outbreak of pneumonic tularemia in the United States, and the first to implicate landscaping activities as a risk factor. Persons who brush-cut or mow, physicians, and health authorities in tularemia-endemic areas should be made aware of this risk.

Key words: tularemia, pneumonia, risk factor, case-control studies

8:55 *Diana M. Bensyl, K. Moran*
Factors Affecting Pilot Survival in Work-Related Aviation Crashes — Alaska, 1990–1999

Background: Work-related aircraft crashes are the leading cause of death at work in Alaska, with civilian pilots having the highest occupational fatality rate (420/100,000/year). To identify variables affecting pilot survival, pilot fatalities occurring in Alaska from 1990–1999 were studied.
Methods: Using data from National Transportation Safety Board crash reports, backward elimination logistic regression was used to identify risk factors associated with pilot fatalities. Variables evaluated include: lap belt use (yes/no), shoulder harness use (yes/no), low visibility and/or poor weather (visual/instrument), light status (light/dark), aircraft type (plane/helicopter), single engine (yes/no), fire involvement (yes/no), pilot flight experience (>1800 hours/≤1800 hours), occurring at/near an airport or off-airport (yes/no), and state of residence (Alaska/other).
Results: There were 678 work-related crashes; 86 (13%) were fatal. Lap belt use had to be excluded because non-use was reported for only four crashes. Shoulder harness use information was often unavailable due to missing aircraft/severity precluding determination; thus, the final model included 619 observations (65 fatal, 554 non-fatal). Significant associations were found between pilot fatalities and fire (Odds ratio (OR)=7.38, 95% Confidence Interval (CI)=3.14–17.38), off-airport crashes (OR=7.27, CI=2.78–19.02), instrument weather conditions (OR=3.73, CI=1.90–7.31), darkness (OR=2.44, CI=1.25–4.78), and non-Alaska resident (OR=2.02, CI=1.04–3.93). Shoulder harness use, aircraft type, engines, and flight experience were not significantly associated with pilot fatalities.
Conclusions: Crashes involving fire, occurring off-airport, in instrument conditions, or after dark were more likely to result in pilot fatalities. Better training and discouraging pilots from flying in dark, poor weather

conditions, especially when unfamiliar with the area, might decrease pilot mortality. Fire risk might be mitigated by safer on-board fuel systems and wearing fire-resistant clothing.

Key words: transportation, aviation, aircraft, occupational accidents

9:15 ***Michael T. Martin, R. Tan, T. Hyde, M. Moore, C. Fiack, D. Cantrell, A. Lawrence, E. Saidla, J. Councilman, G. Lynch, Z. Koppanyi, E. Brown, R. Benson, B. Fields, R. Besser***
Investigation of a Suspected Legionnaires' Disease Outbreak in a Car Parts Manufacturing Plant — Georgia, 2000

Background: Outbreaks of legionellosis have been associated with aerosol exposures in car plants. Legionellosis is not transmitted person-to-person. In October 2000, an employee of a car parts plant died from Legionnaires' diseases (LD). A second employee was hospitalized and several others were ill with fever, myalgia, and cough. We sought to determine if these illnesses represented an outbreak of LD and Pontiac fever.
Methods: Lung tissue from the case-patient was tested at CDC. We searched records at five local hospitals for cases of LD and administered a questionnaire to employees. Febrile illness (FI) was defined as fever and cough or fever, myalgia, and fatigue. Ill employees were evaluated at a local clinic. Environmental samples from multiple sites in the plant were tested for *Legionella* species.
Results: *Legionella pneumophila* serogroup 1 (LP1) was isolated from the case-patient. No additional cases of LD were found. Twenty-one (10%) of 203 employees had FI. There was no clustering of FI in time. Employees at two adjacent work stations were more likely to have had FI (relative risk [RR]=2.4, 95% confidence interval [CI]= 1.1–5.3) and employees with FI were more likely to have a household member with recent respiratory illness (RR=15.6, 95% CI=3.7–65.6). *L. feeleii* and *L. worsleiensis*, but not LP1, were isolated from environmental samples. Serologic testing for bacterial and viral pathogens is pending.
Conclusions: The investigation confirmed a single case of LD. The lack of additional cases, retrieval of LP1 from environmental samples, or clustering of FI makes it unlikely an outbreak of LD occurred. The association of FI with work station and having an ill household member is consistent with an illness transmitted person-to-person.

Key words: Legionnaires' disease, legionellosis, Legionella pneumophila

9:35 ***Peter M. Dull, T. Gomez, L. White, E. Halvorson, J. Johnsen, L. Schuler, L. Shireley, D. Ashford***
Human Anthrax Associated with an Epizootic — North Dakota, 2000: What's the Risk?

Background: Anthrax, a bacterial zoonosis caused by *Bacillus anthracis,* may be transmitted to humans from infected animals. The last known case of human anthrax in the United States occurred in 1992. On September 20, 2000, CDC was notified by the North Dakota State Health Department of a suspected human anthrax case during an epizootic in unvaccinated livestock.
Methods: We interviewed the suspected patient, collected sera for protective antigen (PA) antibody testing, and administered a questionnaire to persons working at 32 farms where livestock-anthrax had occurred. We collected population and occupation data in the area of the epizootic.
Results: On August 28, 2000, a 67-year-old farmer presented with a painless lesion on his face consistent with cutaneous anthrax; he was treated with ciprofloxacin and recovered. Serologic testing was positive (1:200) for anti-PA IgG antibodies. His exposure involved gloved manipulation of the head and hooves of several anthrax-infected cattle carcasses. Between July 6 and September 24, 9 veterinarians and 40 farm-workers handled 157 anthrax-infected animal carcasses in 6 counties with 10 veterinarians and 7600 farm-workers. Of those from whom exposure histories were obtained, all the veterinarians (8/8) and 33% (13/40) of the farm-workers wore gloves. No other symptomatic human anthrax was discovered.
Conclusions: One case of human anthrax occurred among 49 (2%) persons handling infected animals during the largest epizootic in North Dakota history; 40 of 7600 (0.5%) farm-workers and 9 of 10 (90%) veterinarians in this 6-county region were at potential risk of anthrax. Human vaccination was not recommended but may be appropriate in future large epizootics, especially among veterinarians.

Key words: Anthrax, vaccination, risk assessment, occupational health

9:55 Marion A. Kainer, A. Sohn, B. Kuo, W-J. Su, W. Jarvis and the Nosocomial TB in Taiwan Study Group

Risk Assessment of Nosocomial Transmission of *Mycobacterium tuberculosis* — Veterans General Hospital, Taipei, Taiwan, 2000

Background: Worldwide, tuberculosis (TB) is the most common cause of death in adults from a single infectious agent. The incidence of TB in Taiwan is 64.9/100,000, compared to 6.6/100,000 in the United States. The deaths of two Taiwanese healthcare workers (HCWs) from TB prompted a study to assess the risk of nosocomial TB to HCWs.

Methods: We performed a cross-sectional tuberculin skin test (TST) study of Veterans General Hospital Taipei HCWs. Exposure history, demographics, and Bacillus Calmette-Guerin (BCG) scars were recorded. TSTs were read at 48–72 hours; if induration was <10mm, HCWs underwent a second TST. TST positivity was defined as ≥15mm induration. Administrative and environmental controls and use of personal respiratory protection were evaluated.

Results: Of 523 HCWs and students tested, the median induration was 20.0mm (25–75th percentile 15–28mm); 500 (95.6%) had indurations of ≥10mm, 396 (75.7%) ≥15mm, and 123 (23.3%) had blistering reactions. Blistering correlated with induration size. Having ≥1 BCG scar was associated with having TST indurations ≥10mm (odds ratio [OR] 4.6, 95% confidence interval [CI] 1.2–16.1), but not with ≥15mm. HCWs working in obstetrics/gynecology, pediatrics, ambulatory care or the operating room had lower TST positivity rates than other HCWs (OR 0.54, CI 0.34–0.86). Respiratory therapists had the highest TST positivity rate of any occupational group (95%; OR 7.0, CI 1.28–148.6). There were delays in TB patient identification, doors to isolation rooms were left open, and most HCWs did not wear N95 respirators when caring for infectious TB patients.

Conclusions: These HCWs are at increased risk of TST positivity; the high blistering rate suggests intense TB exposure. TB infection control measures are inadequate and require enhancement to reduce TB risk to HCWs.

Keywords: tuberculin test, health personnel, occupational exposure, disease transmission, risk assessment

10:45 Tuberculosis. Moderator: Kenneth G. Castro

10:50 *Peter D. McElroy, K. Southwick, E. Fortenberry, P. Leone, B. Levine, R. Stroupe, C. Woodley, L. Diem, R. Ridzon*

Tuberculosis in a Homeless Population — Raleigh, North Carolina, 1999-2000

Background: Congregate living, substance abuse, and HIV place homeless persons at increased risk for tuberculosis (TB). Up to 30% of TB patients are homeless in some urban areas. A cluster of nine TB case-patients from a single homeless shelter was investigated to determine when *Mycobacterium tuberculosis* transmission occurred and who should be targeted for TB screening.

Methods: We reviewed shelter attendance and medical records of the nine TB case-patients and all other 1999–2000 homeless TB case-patients. DNA-fingerprinting was performed on all *M. tuberculosis* isolates from 1999–2000 Raleigh case-patients (n=50). A period of *M. tuberculosis* exposure was estimated using attendance records of the infectious case-patients. Exposed shelter residents were identified for targeted TB screening using a retrospective cohort design.

Results: In addition to the initial cluster of nine TB case-patients, another 14 case-patients were identified. An epidemiologic link to the same shelter was identified for all but one case-patient. The 23 *M. tuberculosis* isolates from these case-patients had matching DNA-fingerprints. All but one case-patient was male, 21 (91%) were African-American, and 14 (61%) had HIV co-infection. A 5-month exposure period was identified (9/99 to 1/00), during which 1,420 men stayed at least one night in the shelter (median=12 nights), but only 76 stayed

≥115 nights. Non-Hispanic men with ≥115 nights exposure had a higher risk of a positive tuberculin skin test (risk ratio=3.5, 95% confidence interval=1.9–6.3) when compared to those with <40 nights.
Conclusions: This cluster of homeless TB case-patients was over twice as large as originally recognized. Earlier recognition of this shelter as an *M. tuberculosis* transmission site would have controlled this outbreak sooner, highlighting the need to pursue more innovative contact investigations around homeless persons with TB.

Key words: homeless, tuberculosis, latent infection, *Mycobacterium tuberculosis*

11:10 ***Janet L. Larson, L. Lambert, R. Stricof, R. Ridzon, T. Navin***
***Mycobacterium tuberculosis* Contamination and Potential Exposure from a Bronchoscope — Pennsylvania, 2000**

Background: Despite public health advisories, serious infections from inadequately disinfected bronchoscopes continue. In October 2000, a Pennsylvania hospital reported three patients with *Mycobacterium tuberculosis* culture-positive bronchoscopy specimens.
Methods: We reviewed the hospital's history of tuberculosis (TB) patients, bronchoscopy procedure log, laboratory acid-fast bacilli (AFB) specimen log, and medical records for bronchoscopy patients. Hospital procedures for patient isolation, bronchoscope disinfection, and laboratory processing of AFB specimens were evaluated. DNA-fingerprinting was performed on the *M. tuberculosis* isolates.
Results: All three *M. tuberculosis* isolates had matching DNA fingerprints. The first *M. tuberculosis* culture-positive bronchoscopy patient (source patient) had clinical TB, was the hospital's only TB patient within one year, and was isolated during hospitalization. The two subsequent patients with *M. tuberculosis* culture-positive bronchoscopy specimens did not have clinical presentations consistent with TB and had no known TB contacts. Specimens were properly processed for AFB in the laboratory and no cross-contamination was found. The three *M. tuberculosis* culture-positive specimens were collected with the same bronchoscope within nine days. Specimens collected with this bronchoscope were significantly more likely to be contaminated with *M. tuberculosis* than all other laboratory specimens (Risk Ratio=25.8, 95% Confidence Interval=1.3–497.7). The bronchoscope was improperly disinfected between patient procedures. Errors were made during preliminary manual cleaning, and an incompatible automated washer was used for final disinfection procedures.
Conclusions: Two bronchoscopy specimens collected at this hospital were most likely contaminated with *M. tuberculosis* from an improperly disinfected bronchoscope. The bronchoscopy patients were also potentially exposed to *M. tuberculosis*. Specimen contamination and potential transmission of *M. tuberculosis* infection probably occurred because proper procedures for bronchoscope disinfection were not followed.

Key words: mycobacterium, tuberculosis, bronchoscope, endoscope

11:30 ***Lorna E. Thorpe, T. Khorosheva, T. Aptekar, L. Rybka, C. Wells, H. Kluge, W. Jakubowiak, N. Binkin, B. Kazeonny***
Treating Tuberculosis Disease in Russia: Results from a Demonstration Control Program, 1999-2000

Background: Tuberculosis (TB) incidence in Russia rose almost 3-fold between 1991 and 1998, from 32/100,000 to 84/100,000. In 1999, CDC helped launch a demonstration TB program in Orel Oblast (region) based on the World Health Organization (WHO) strategy of directly observed treatment, short-course (DOTS), with a four-drug regimen.
Methods: A retrospective cohort analysis was performed on all smear-positive pulmonary TB patients with no prior treatment who were diagnosed between October 1999 and March 2000. Factors associated with successfully completing 6 months of therapy were examined using logistic regression, and adjusted odds ratios (AOR) were calculated.
Results: Of the 124 smear-positive patients, 102 (83%) were men. Treatment outcomes were available for 119 (96%) of these patients. Of seven (6%) who failed treatment, four had isolates resistant to at least isoniazid and rifampin (multidrug resistant). An additional 14 (12%) died, and eight (7%) were lost to follow-up. Thus,

95 (72%) successfully completed treatment. The strongest predictor of successful completion was lack of cavities on chest radiograph (AOR=3.3, 95% confidence interval [CI]=1.4–7.9). Patients with susceptibility to all drugs in the treatment regimen were twice as likely as those with resistance to complete treatment successfully (AOR=2.1, 95% CI=0.9–5.0), although this difference was not statistically significant. Neither age nor gender was predictive of successful completion of treatment.
Conclusions: Treatment success rates were lower than the WHO target of 85% for smear positive patients, but consistent with expected success rates for a newly implemented DOTS project. These data confirm the feasibility of instituting WHO DOTS strategies for TB control in Russia. Further efforts are needed to reduce death rates and manage drug resistance.

Key words: tuberculosis, treatment outcomes, DOTS, Russia

Monday–Tuesday Poster Session

12:30 Poster Session No. 1 – Meet the Authors

(See Monday schedule for list of presentations)

Tuesday Afternoon — April 24, 2001

1:30 Physical Activity and Cardiovascular Health. Moderator: H. Wayne Giles

1:35 *Catherine E. Staunton, A. Dellinger*
Why Children in the United States Do Not Walk or Bike to School: 1999 Survey Elucidates Parental Concerns

Background: Despite the well-documented health benefits of walking and biking, most children in the U.S. do not walk or bike to school. Understanding barriers to these activities is important for effective public health intervention. Until now there have been no nationwide data addressing this question.
Methods: The HealthStyles Survey is an annual mail survey designed to provide information on health-related attitudes and behaviors. In 1999, it surveyed a nationally representative sample of 3554 adults (response rate 74%). Among respondents, 749 had at least one child aged 5 to 18 years. These adults were asked if their youngest child walked or biked to school and whether any of six specified conditions made it difficult to do so.
Results: Respondents reported that 19.8% of children walked and 6.3% biked to school at least once a week. This represented 14.1% of all trips to and from school (10.6% walking, 3.5% biking). When questioned about factors that made walking or biking difficult, parents reported long distances (55.3%), traffic danger (40.5%), adverse weather (24.0%), danger of crime (18.0%), opposing school policy (7.5%) and "other reasons" (26.5%). Of respondents reporting that it was not difficult for their child to walk or bike to school (16.1%), more than three times as many children walked (63.9%) or biked (20.6%).
Conclusions: For the first time a national survey has described the diverse barriers that prevent most children from walking and biking to school. When these barriers were not present more than three-fourths of children did walk or bike. Attempts to increase walking and biking to school will need to address these concerns.

Key words: pedestrians, walking, bicycling, school, children, attitudes

1:55 ***Regina L. Tan, L. Martin, K. Powell***
Physical Activity in Georgia, 1999: If You Ask a New Question, Do You Get a New Answer?

Background: Regular physical activity (PA) decreases the risk for several leading causes of death in the United States (e.g., coronary heart disease, stroke, and diabetes). Since 1984, states have used the Behavioral Risk Factor Surveillance System (BRFSS) to assess the prevalence of recommended levels of PA. Initially, the recommended PA level was 20 minutes of vigorous activity 3 days per week. Current guidelines recommend 30 minutes of at least moderate activity, 5 or more days per week. Written for old recommendations, traditional BRFSS questions might not be optimal for assessing the prevalence of PA at currently recommended levels. In 1999, pilot questions, written to address the change in recommendations, were included in the Georgia BRFSS. We compared PA prevalence estimates obtained with traditional and pilot BRFSS PA questions.
Methods: Traditional and pilot PA questions were administered to 2,079 adults in Georgia as part of the BRFSS telephone survey. Based on responses to each question set, the percentage of respondents meeting old and new recommendations and the percentage reporting no activity were calculated. Data were weighted to account for sampling design.
Results: In 1999, 12.7% (95% Confidence Interval (CI)=11.1–14.4) of respondents met old recommendations with traditional questions; 26.0% (CI=23.7–28.3) met old recommendations with pilot questions. In addition, 27.0% (CI=24.7–29.3) met new recommendations with traditional questions; 32.7% (CI=30.3–35.1) met new recommendations with pilot questions. Finally, 25.9% (CI=23.6–28.1) reported inactivity with traditional questions and 15.4% (CI=13.2–17.6) with pilot questions.
Conclusions: Compared with traditional questions, pilot questions gave higher prevalence estimates of adults meeting old and new recommendations and lower prevalence estimates of inactivity. These differences must be considered when tracking BRFSS estimates of PA over time.

Key words: BRFSS, exercise, physical activity, physical fitness, health

2:15 ***Verna L. Lamar Welch, M. Casper, K. Greenlund, W. Giles, Z. Zheng, S. Rith-Najarian***
Prevalence of Lower Extremity Arterial Disease Among American Indians — Bemidji Service Area, United States, 1992–1994

Background: Early detection of lower extremity arterial disease (LEAD) allows for risk factor modification which might lower subsequent morbidity and mortality from cardiovascular disease (CVD). The Inter-Tribal Heart Project (ITHP) evaluated CVD risk factors among Chippewa and Menominee Indians in the Bemidji Service Area, which has the highest CVD death rates in the United States.
Methods: To evaluate the prevalence of, and risk factors for, LEAD in ITHP, we measured the ankle brachial index (ABI) in 1,333 randomly selected individuals (842 women and 491 men) aged >25 years. LEAD was defined as an ABI < 0.90. We used generalized linear models to calculate the age-adjusted mean of continuous risk factors and separate logistic regression models to examine the age-adjusted relationship between LEAD and categorical risk factors.
Results: Approximately 6.4% of participants had LEAD (6.9% of men, 6.1% of women). Among women, LEAD was associated with lower high-density lipoprotein cholesterol; higher diastolic blood pressure, creatinine, and triglycerides ($p \leq 0.05$). Among men, LEAD was associated with higher creatinine ($p \leq 0.05$). Prevalent LEAD was associated with current smoking which was more pronounced in women than men for current smoking versus never smoking: Odds Ratio [OR]=2.1, 95% Confidence Interval [CI] =1.12–3.97 for women; OR=1.6, 95%CI=0.73–3.57 for men). The prevalence of LEAD was twice as high in diabetics compared to nondiabetics for men (OR=2.0, 95%CI=0.94–4.28) and women (OR=2.2, 95%CI= 1.20– 4.11).
Conclusions: The prevalence of LEAD was higher in ITHP than previously reported among American Indians. LEAD was associated with several CVD risk factors, particularly among women. Clinicians should be aware of the need to assess the presence of LEAD among individual at high risk for CVD.

Key words: peripheral arterial disease, lower extremity arterial disease, American Indians, risk factor, cardiovascular disease

2:35 ***Carma S. Ayala, K. Greenlund, N. Keenan, J. Croft, W. Giles, A. Malarcher***
Gender Differences in Stroke Subtype Mortality Among Racial/Ethnic Populations — United States, 1995–1998

Background: Stroke is the third leading cause of death for both men and women. Ischemic stroke accounts for 70%–80% of strokes, but intracerebral (ICH) and subarachnoid (SAH) hemorrhagic strokes have a higher risk for fatality. Although death rates from stroke overall are higher among men than women, patterns may be different by stroke subtype and race/ethnicity. We therefore examined gender differences in stroke subtype mortality among the major racial/ethnic groups in the U.S.
Methods: We analyzed National Vital Statistics death certificate data for 1995–1998 to determine sex-specific death rates (per 100,000) for ischemic (n=507,256), ICH (n=98,709), and SAH (n=27,334) strokes among whites, blacks, American Indians/Alaska Natives (AIAN), Asians / Pacific Islanders (API), and Hispanics. Rates were standardized to the U.S. standard population. We calculated risk ratios (RRs) and 95% confidence intervals (CIs) with men as the referent within each racial/ethnic group.
Results: Ischemic stroke death rates were higher for women than men among whites only (RR=1.21, 95% CI=1.21–1.22). Ischemic and ICH stroke death rates were higher for men than women among blacks, APIs, and Hispanics; rates by sex were comparable among AIANs. Women had higher death rates than men for SAH in all racial/ethnic groups: RRs (95% CIs) were 1.55 (1.51–1.60) among whites, 1.7 (1.6–1.9) among blacks, 2.6 (1.8–3.7) among AIANs, 1.6 (1.4–1.8) among APIs, and 1.6 (1.4–1.7) among Hispanics.
Conclusions: Patterns of gender differences for stroke subtype mortality vary among race/ethnicity. Public health efforts to reduce the burden of stroke among all groups include primary and secondary prevention as well as increasing awareness of signs and symptoms for early detection and effective treatment of stroke. Focused effort should include those groups at highest risk.

Key words: stroke subtype, stroke mortality, rate ratio, gender gap

2:55 ***Amy D. Sullivan, R. Howard, N. Clarke, K. Hedberg***
Cardiovascular Disease Risks and Hospitalization in Oregon's Medicaid Population, 1998–1999

Background: Cardiovascular disease (CVD) is Oregon's leading cause of hospitalization and death. To assess the impact of major CVD risk factors in Oregon's Medicaid population we compare the prevalence of smoking, obesity, diabetes, hypertension, and high cholesterol among Medicaid-eligible Oregonians and the general population, and evaluate associations between these risk factors and Medicaid claims for CVD hospitalizations.
Methods: Self-reported risk data were obtained from Oregon's Medicaid Behavioral Risk Factor Survey (mBRFS) and Behavioral Risk Factor Surveillance System (BRFSS). MBRFS was administered by telephone from June 1999 through August 1999 to a stratified random sample of Medicaid-eligible persons. 1999 BRFSS data were collected using a random-digit dialing telephone survey. Adjudicated Medicaid claims data for the year before each mBRFS interview were obtained through Oregon's Public Health/Medicaid Assessment Initiative, and linked to mBRFS data.
Results: Among 2,711 Medicaid-eligible Oregonians, 37% were current smokers, 31% were obese, 11% had diabetes, 28% had high blood pressure, 25% had high cholesterol, and 37% had $\geq$2 of these risk factors. Among all Oregonians, 21% were current smokers, 20% were obese, 5% had diabetes, 12% had high blood pressure, 11% had high cholesterol, and 29% had $\geq$2 risk factors. Based on claims data, 3% of Medicaid-eligible Oregonians were hospitalized for CVD during the year before their mBRFS interview. Compared to persons who were not hospitalized, CVD hospitalizations increased as the number of CVD risk factors increased (trend test, $p<0.05$).
Conclusions: CVD risk factors are more common among Oregon's Medicaid population than among the general population, and are associated with CVD hospitalizations among the former. Targeted interventions to prevent CVD risks among Medicaid recipients could improve cardiovascular health in this high-risk population.

Key words: cardiovascular disease, Medicaid, risk factors

3:35 Waterborne Diseases. Moderator: Eric D. Mintz

3:40 *Sumathi Sivapalasingam, C. Friedman, J. Macy, B. Gold, R. Quick*
Effective Treatment of *Helicobacter pylori* Infection in a High Prevalence Rural Bolivian Population Using Directly Observed Therapy

Background: Infection with *H. pylori* can cause duodenal ulcers and gastric adenocarcinoma. The definitive mode of transmission is unknown. To confirm previous research showing that using a narrow-mouth water vessel and water disinfectant prevented infection in children, we are determining whether special vessel use can prevent *H. pylori* re-infection in a treated population.
Methods: We tested residents of 2 villages for *H. pylori* using urea breath tests (UBT). Special vessels and water disinfectant were distributed to one village and their use is monitored monthly; the other village received no intervention. Twice daily directly observed therapy (DOT) for the recommended 10 days with lansoprazole, clarithromycin and amoxicillin was offered to persons testing positive. UBTs were repeated at 2 months; *H. pylori*-positive persons were retreated. Village re-infection rates will be determined by UBT and compared after 1 year.
Results: We tested 1,065 (97%) of 1,093 residents of 2 villages; 849(81%) were positive and village prevalence rates were similar. Prevalence ranged from 12% in children <2 years to 93% in persons $\geq$ 14 years. Of 849 persons with positive tests, 699 (82%) received treatment. Of these, 552(79%) had follow-up UBTs, 484 (87%) of which were negative. Eradication rates were 94% with 20 treatment doses, 94% with 15–19 doses and 85% with 10–14 doses. Vessel use rates ranged from 87%–100%.
Conclusions: *H. pylori* treatment in this high-prevalence population was effective with 10 or more doses and DOT, suggesting that, for compliant patients, recommended treatment duration could be shortened to 7 days, thereby reducing costs and improving compliance. Use of the vessel remains high after 6 months; *H. pylori* re-infection rates will be determined in June 2001.

Key words: *Helicobacter pylori,* transmission, treatment, prevalence

4:00 *Melinda J. Wilkins, R. Wahl, B-P. Zhu, L. Cameron*
Effect of Maternal Consumption of Arsenic in Drinking Water on Perinatal Outcomes in Nine Michigan Counties, 1989–1998

Background: Few studies have assessed the relation between maternal exposure to arsenic in drinking water and adverse perinatal outcomes. International studies use arsenic exposure levels exceeding the highest levels found in the United States and hint at a causal relation. The maximum contamination level (MCL) for arsenic in U.S. municipal water systems dropped from 50 µg/L to 10 µg/L in January 2001. This study investigates adverse perinatal outcomes at exposure levels below 50 µg/L.
Methods: A retrospective cohort study was conducted. Risk factor and outcome data were analyzed from electronic birth certificates of 317,919 singleton infants born alive to mothers in nine counties in the "thumb" area of Michigan from 1989 to 1998. This geographic area has naturally occurring arsenic in the ground water. A single arsenic value was calculated for each minor civil division (MCD) within the nine counties, using arsenic test results from 16,000 water samples in the Michigan Department of Environmental Quality database for the years 1983 to 2000. The exposure value for each mother was the arsenic value calculated for the MCD in which she resided.
Results: The prevalence of low birth weight, preterm birth, and small for gestational age among the cohort was 5.8%, 7.2%, and 10.2% respectively. Stratified and multivariate analysis showed no significant association between any of these adverse perinatal outcomes and maternal consumption of arsenic at levels ranging from non-detectable to 30.1 µg/L.
Conclusions: Although our study did not identify an association between low-level arsenic exposure and adverse perinatal outcomes, assigning community arsenic levels to mothers may misclassify some exposure. Although our results appear reassuring, studies using individual exposure assessments may be more conclusive.

Key words: arsenic, reproduction, water consumption, environment

4:20 ***Josefa M. Rangel, B. Lopez, M. Alvarez, C. Mendoza, P. Souter, C. Olson, J. Velazquez, M. Hoekstra, M. Reller, K. Baier, S. Luby***

A Novel Technology to Purify Water: Microbiologic Evaluation of Combined Flocculation and Chlorination of Household Drinking Water — Guatemala, 2000

Background: An estimated 1.3 billion persons in low-income countries do not have access to safe drinking water. Chlorine, a useful water treatment agent, is less effective in turbid water, and lacks a visible effect, limiting its acceptability. Procter & Gamble has developed a combined flocculant and chlorination technology (flocculant) to reduce microbial, organic, and heavy metal contaminants in water. We evaluated the flocculant's microbiologic efficacy in Guatemalan villagers' households.

Methods: We enrolled 100 randomly selected households from four neighboring Guatemalan villages. Groups A, B, and C received flocculant; Group D, chlorine bleach, and Group E no intervention. Groups B and D received a CDC water storage vessel, and Group C, a covered bucket with spigot. We collected household water samples for 4 weeks, and measured total coliforms, *E. coli,* and turbidity levels. We defined potable water as having no detectable *E. coli* per 100 mL.

Results: Eight (8%) baseline water samples were potable. Follow-up water samples were more likely to be potable than control samples (A 83%, B 92%, C 93%, and D 92%, versus E 5%). Among 35 intervention households with turbid baseline water samples ($\geq$5 nephalometric units (NTU)), median turbidity decreased by 4.0 NTU in 23 households receiving flocculant, compared with 2.5 NTU in 12 households receiving chlorine ($P = 0.03$). Among flocculant users, 98% reported improved water clarity compared with 45% of chlorine users ($P < 0.0001$).

Conclusions: The flocculant technology improved water potability as effectively as chlorine bleach and significantly decreased water turbidity. Improved water clarity could motivate more persons to effectively treat their water.

Key words: flocculation, water purification, water microbiology, Guatemala

4:40 ***Valerie D. Garrett, R. Garman, D. Berry, H. Marx, S. Thomas, S. Wilson, J. Maillard, B. Whitley, S. Levine, G. Caldwell, D. Gordon, T. Jones, E. Simoes, C. Crowe, D. Broughel, A. Sulka, S. Van Duyne, P. Mead***

Sporadic *Salmonella* Bareilly Infections Linked with Well, Spring and Bottled Water — Southeastern United States, April–August 2000

Background: Although salmonellosis strikes 1.4 million Americans annually, the source of most infections is unknown. In June 2000, CDC detected an increase in infections caused by *Salmonella* Bareilly (SB), an amphibian-associated serotype endemic to humans in the southeastern United States.

Methods: To determine risk factors for infection, we conducted a case-control study. We defined a case as infection with SB between April and August 2000. Age-matched controls were selected from patients infected with other *Salmonella* serotypes.

Results: We identified 95 case-patients in 10 southeastern states. Their median age was 6 years (range <1–86 years). Subtyping of 87 isolates yielded 58 distinct pulsed-field gel electrophoresis (PFGE) patterns, suggesting multiple sources of infection. Among 43 case-patients enrolled in the case-control study, 19 (44%) were hospitalized; none died. Twenty-five (58%) case-patients reported drinking well or spring water in the week before illness, compared with 17 (22%) of 76 controls (matched odds ratio [OR] 4.59, $p<0.001$). Water from one case-patient's well yielded SB indistinguishable by PFGE from the patient's isolate. Among case-patients not exposed to well or spring water, 14 (78%) drank bottled water, compared with 14 (42%) of 33 controls (OR 6.75, $p=0.02$); 8 (44%) case-patients drank bottled water processed at Company A, compared with 1 (3%) control (OR undefined, $p=0.001$). Although Company A bottles water from a southeastern spring, no defects in its water purification system were identified.

Conclusions: Public health officials should consider well, spring and bottled water as potential sources for infection with SB and other amphibian-associated serotypes. Because coliform assays may not detect these organisms, suspect waters should be tested specifically for *Salmonella.* Mechanisms of water contamination require further evaluation.

Key words: Salmonella, water, amphibian, epidemiology

Tuesday Evening — April 24, 2001

Special Session — International Night

Sponsored by the Training in Epidemiology and Public Health Interventions Network (TEPHINET)

7:00 International Health: Information for Action. Moderator: James W. Curran

7:15 ***Eleni Galanis, A. King, D. Skowronski, L. Palkonyay, C. Dubuc, G. De Serres, and the members of the Oculo-Respiratory Syndrome Working Group***

Oculo-Respiratory Symptoms Associated with Influenza Immunization. — Canada, 2000

Background: In late October 2000, Health Canada was informed of 82 individuals who developed ocular or respiratory symptoms within hours of influenza immunization. This prompted intensive public health investigations to determine the frequency and severity of this unusual vaccine-associated adverse event and its mechanism.

Methods: Canadian public health authorities developed the following case definition for enhanced surveillance of the reaction: red eyes, respiratory symptoms, facial edema or a combination of these occurring within two to 24 hours of receipt of the influenza vaccine, and all resolving within 48 hours of onset. Cross-sectional surveys and retrospective cohort studies to define the clinical manifestations, incidence rate and relative risk of developing the adverse event are ongoing. Product-related investigations to identify a potential causative component are also underway.

Results: By December 18, 2000, Health Canada received reports of 1,115 persons who met the case definition. Approximately 75% of the cases were between 30 and 59 years of age; 80% were female. Over 98% of cases were associated with one vaccine product from manufacturer B. The incidence rate of these adverse events among vaccine recipients ranged from 2.1% to 2.4%. Electron microscopy of the product from manufacturer B has revealed a higher than expected concentration of agglomerated unsplit Panama strain virus.

Conclusions: The identification of this influenza vaccine-associated adverse event and the ensuing public health response has led to a change in pre-licensure requirements for next year's vaccine. Because the benefits of influenza immunization greatly exceed the risks associated with this adverse event, health authorities have consistently agreed that influenza immunization programs should continue.

Key words: Influenza vaccine; adverse drug reaction reporting systems; conjunctivitis, allergic; signs and symptoms, respiratory

7:35 ***Eugen Manyora, M. Tshimanga, A. van Ommen***

Dysentery Outbreak at Chikurubi Maximum Prison — Goromonzi District, Zimbabwe, 1999

Background: An outbreak of bacillary dysentery occurred in a prison in Zimbabwe prompting an investigation to characterize the outbreak, identify the risk factors, and apply appropriate disease control and preventive measures.

Methods: We conducted a case-control study which included all 73 prisoners who had bloody diarrhea in the period October–December 1998. Seventy-three controls were randomly selected from the same section of the prison the case patients inhabited.

Results: Symptoms included abdominal cramps (89%), tenesmus (55%), fever (48%) and nausea (37%). Risk factors significantly associated with contracting bloody diarrhea were drinking water from a bowser (OR-5.01, $p<0.001$) and lower education level (OR-4.21, $p= 0.002$). Hand washing after toilet use and before meals (OR-

0.05, p<0.001 and OR -0.10, p= 0.004 respectively) was found to be protective. None of the food items reported as being consumed were significantly associated with the illness. Flies were a common problem. Food for daily meals was prepared in the morning and stored in rusty metal containers. Food handlers were not medically screened, and food was served with bare hands in the female section. Communal hand washing without soap was practiced during water shortage periods. Temporary shelter for some of the female prisoners did not have toilets or running water. Only buckets of water were provided.

Conclusions: The bowser water was the most likely source of infection, and transmission was facilitated by poor hygienic practices in the prison. Some of the recommendations from the study were implemented: appropriate food containers and wooden spoons are now being used in all prison sections; medical examinations of the food examiners are being done; and soap for hand washing is available to all prisoners. Flies are under control.

Key words: dysentery, outbreak, shigellosis

7:55 *Peter Salama, F. Assefa, L. Talley, P. Spiegel, A. van der Veen, C. Gotway*
Malnutrition and Mortality During a Famine — Gode District, Ethiopia, August, 2000

Background: The World Food Programme estimated that 10 million people were at risk of starvation in Ethiopia in 2000. However, no epidemiologic data, demonstrating the magnitude or distribution of malnutrition and mortality, were available for the population of Gode district, the epicenter of the famine. Such data were urgently needed for determining health program priorities and targeting the humanitarian response of international agencies.

Methods: In August, 2000, we collected anthropometric and retrospective mortality data during a two-stage cluster survey that included 595 households and 4032 people. We performed the analysis using EpiInfo version 6.40b.

Results: From December 1999 through July 2000, a total of 293 deaths occurred in the sample population. The crude mortality rate was 3.1/10,000/day (95% confidence interval [CI]: 2.4–3.8/10,000/day), three times the cut-off level used to define an emergency. The death rate for children <5 years was 6.7/10,000/day (95% CI: 5.3–8.0/10,000/day). Approximately 72% of deaths occurred before major relief interventions began in May 2000. Malnutrition contributed to 72.3% of all deaths among children aged <5 years. Measles alone or in combination with malnutrition accounted for 22.0% of 159 deaths among children aged <5 years and for 16.6% of 72 deaths among children aged 5 to 14 years. Prevalence rates for acute malnutrition were 29.1% (95% CI: 24.7–33.4) for children aged < 5 years and 22.7% (95% CI: 17.9– 27.5) for adults aged 18 to 59 years.

Conclusions: To prevent unnecessary deaths, humanitarian response to famine needs to be rapid and based on sound epidemiological evidence. Interventions, such as mass measles vaccination campaigns with coverage extended to children aged <14 years, and feeding programs targeting malnourished adults, and children, should be implemented immediately in Ethiopia.

Key words: malnutrition, mortality, famine, measles, Africa, adults

8:15 *Namwat Chawetsan, C. Santikan, W. Hanchaoworakul, C. Jirapongsa*
Situation Analysis: Motorcycle Injury and Motorcyclists' Helmet Use — Thailand, 1995–1998

Background: Injury is the leading cause of death among young Thais. The majority of all injuries come from motorcycle traffic accidents. Helmet laws have been enacted in Thailand since 1996 (1995 in Bangkok and 1996 nationwide). We aimed to describe changes in helmet use after law implementation and describe severe head injury among motorcyclists.

Methods: Review of sentinel injury surveillance data in five regional hospitals during 1995–1998 was done. Head injury was defined and graded using the Injury Severity Score (ISS). Severe head injury was scored 4–6 out of 6.

Results: Data from five large regional hospitals in different parts of Thailand showed 270,347 injury patients. Of these, 139,678(51%) were injured in traffic accidents. Seventy-four percent of them (102,685 cases) were motorcyclists. The male: female ratio was 3:1. Sixty-five percent of them were 15–30 years old. The proportion

of helmet use among the injured was 3% (1995), 17% (1996), 14% (1997), and 18% (1998). Compared to Bangkok, which were 57%, 58%, 50% and 50%, respectively. In all areas, a high proportion of motorcyclists used helmets in 1996. Motorcyclists in Bangkok had higher a proportion of helmet-use than in other provinces. The drivers had a higher proportion of helmet use than passengers. Case fatality rates were 0.78% and 2.76% among the helmeted group and the non-helmeted group. 19.1% of the helmeted group and 11.2% of non-helmeted group had severe head injury.

Conclusions: Helmets were a protective factor for severe head injury. Law enforcement is an important factor in contributing to helmet wearing. There was the strongest enforcement in the first year after legislation and in Bangkok. The enforcement should be done continuously and countrywide.

Key words: accident, helmet, injury, law, motorcycle, Thailand

8:35 ***Julie A. Stratton, A. Ellis, J. Aramini, R. Meyers, F. Pollari, B. Ciebin, A. Li, F. Jamieson, D. Middleton, R. Ahmed, C. Clark, M. McQuigge, D. Patterson***

Waterborne Outbreak of Gastroenteritis Associated with a Contaminated Municipal Water Supply — Walkerton, Ontario, Canada, 2000

Background: On May 19, 2000, an outbreak was identified in Walkerton, Ontario after two cases of bloody diarrhea caused by *Escherichia coli* O157:H7 were reported to the medical officer of health. Failure to find a common food source prompted an investigation into the municipal water supply. A boil water advisory was issued on May 21.

Methods: Persons with reported gastroenteritis were interviewed using a standard questionnaire. A cross-sectional survey of Walkerton area households was also conducted to evaluate risk factors and estimate burden of illness. Historical well reports and water flow data were reviewed. Microbiological examination of water, soil, livestock manure, and patient fecal samples were performed, including phage typing and genetic typing (PFGE) of isolates of *E. coli* O157:H7 and *Campylobacter* spp.

Results: Case investigations identified 1,346 cases with diarrhea or bloody diarrhea. Cross-sectional survey results showed that residents who consumed Walkerton water and whose homes were supplied by Walkerton water were 11.7 times more likely to be a primary case (95% CI 4.2–33.6). Well #5, a shallow well, was subject to surface water contamination. Heavy rainfall was recorded between May 8 and 12. Well #5 water was positive for *E. coli* O157:H7 by polymerase chain reaction. Manure samples from cattle on the farm adjacent to Well #5 were positive for *E. coli* O157:H7 and *Campylobacter* spp.; most *E. coli* O157:H7 and *Campylobacter* spp. isolates showed the same phenotypic and genotypic patterns as human cases.

Conclusions: This outbreak was associated with consumption of contaminated municipal drinking water from a town well that was likely infiltrated by runoff following heavy rain. This emphasizes the need for a multi-barrier approach to water treatment.

Key words: *Escherichia coli*, *Campylobacter*, water, outbreak

— Late-Breaking Reports —

8:55 ***Juaquino Rosario, T. Estepan, Z. Navarro, E. Morillo, C. Pedreira, V. Martinez-de-Aragon***

Poliovirus Type 1 Outbreak — Dominican Republic, 2000–2001

Background: The American Continent was certified polio free in 1994. In October 2000, four cases of paralysis attributed to exposure of an unknown agricultural pesticide appeared in newspapers in the Dominican Republic (DR). The Field Epidemiology Training Program (FETP) in the DR conducted an outbreak investigation in early November.

Methods: From November 8 to December 1, 2000, the FETP investigated the initial paralytic cases. Cases met the definition of acute flaccid paralysis (AFP) without a history of exposure to toxins. Hospital records were reviewed and new cases searched among patient contacts. A suspected case was any person under 15 years of age with AFP, without associated trauma, or any person diagnosed with acute neuritis, polineuritis, or Guillian Barre syndrome. Suspected cases were evaluated clinically for flaccid paralysis, stool samples taken,

and a standard questionnaire administered. Stool samples were sent to a regional laboratory for viral isolation and to CDC for genetic study. Cases were confirmed as polio by laboratory viral isolation, or polio-compatible by epidemiological linkage to a laboratory confirmed case or neurological evaluation compatible with polio 60 days after the onset of paralysis.

Results: A total of 20 cases of AFP were identified. The age range of cases was 16 months to 21 years of age; 17 cases (85%) were less than six years of age. In total, 17 persons (85%) were confirmed with polio; six persons (35%) had laboratory-confirmed poliovirus type 1 isolates; the remainder were epi-linked. Thirteen persons (76%) lived in the municipality of Constanza, eight (47%) were female, and 15 (88%) were not vaccinated.

Conclusions: The timely response to the reported cases of paralysis allowed for prompt action including active search for AFP cases, OPV vaccination campaign, and strengthening of AFP surveillance in the country.

Key words: poliomyelitis, poliovirus type 1, Dominican Republic, acute flaccid paralysis, AFP surveillance

9:10 ***Margaret Lamunu, S, Harper, Ebola Hemorrhagic Fever Outbreak Response Team***
Control of an Outbreak of Viral Hemorrhagic Fever — Uganda, 2000–2001

Background: Gulu District reported an outbreak of suspect viral hemorrhagic fever to the Ugandan Ministry of Health (MOH) on October 8, 2000. With assistance from an international team coordinated by the World Health Organization, the MOH promptly responded to confirm and control this outbreak.

Methods: The National Institute for Virology, South Africa, and the US Centers for Disease Control and Prevention performed laboratory testing of clinical specimens from suspect cases. Control activities were organized around community-based surveillance using sensitive case definitions, case management and social mobilization. We report results for presumptive cases; these include laboratory-confirmed cases and persons who met a clinical case definition and had no laboratory testing.

Results: Of the 425 presumptive cases of Ebola hemorrhagic fever (EHF), 218 (51%) were laboratory confirmed as Ebola-Sudan virus. The 425 cases were reported from three districts: Gulu, 393 cases (93%); Masindi, 27 cases (6%); Mbarara, 5 cases (1%). Case fatality rate was 53%. Mean age was 27 years (range: three days to 72 years); 269 cases were female. Reported dates of disease onset ranged from August 30, 2000 to January 9, 2001; the epidemic curve peaked during the week of October 15, 2000. Despite implementation of barrier nursing practices in special isolation wards, transmission to health care providers still occurred.

Conclusions: Control activities successfully contained this largest reported outbreak of EHF. Community-based health surveillance practices used to control this outbreak in Gulu District will be extended to include other epidemic-prone diseases. This improved surveillance will promote more timely detection of future outbreaks and serve as a model for the implementation of the national integrated disease surveillance.

Key words: Ebola, outbreak, surveillance, viral hemorrhagic fever

Wednesday Morning — April 25, 2001

8:30 Perinatal, Neonatal and Infant Health. Moderator: Coleen Boyle

8:35 ***Wanda D. Barfield, S. Iyasu, K. Tomashek***
Unrecognized Deaths: Perinatal Mortality in the United States, 1995–1997

Background: Infant mortality (death <1 year) is used to gauge a nation's quality of and access to medical care and socioeconomic conditions, but it excludes late fetal deaths that may be etiologically similar to early neonatal deaths. Surveillance of perinatal mortality (late fetal plus early neonatal deaths) is needed to provide a complete picture of the health of women, fetuses and newborns.

Methods: We used U.S. fetal death and linked infant birth-death certificate data to analyze perinatal deaths during 1995–1997. Perinatal mortality rates (per 1,000 live births and fetal deaths) and rate ratios between blacks and whites were calculated. We compared components of perinatal mortality — late fetal deaths (>28 weeks' gestation) and early neonatal deaths (<7 days of age) — within races to assess classification biases in reporting. We also determined the number of late neonatal (7–27 days of age) and postneonatal (28–364 days of age) deaths.

Results: During 1995–1997, more perinatal deaths (85,465) occurred than late neonatal (10,992) or postneonatal (29,643) deaths. The total perinatal mortality rate was 7.6. Of all perinatal deaths, 40,208 (47%) were fetal deaths; >50% of these deaths occurred between 36–41 weeks' gestation. Blacks experienced higher perinatal mortality rates than whites (rate ratio = 2.1). Among perinatal deaths >28 weeks gestation, the ratio of fetal to neonatal deaths was 3.4 among blacks and 2.4 among whites.

Conclusions: Most fetal and infant deaths occur during the perinatal period and many occur among older, potentially viable fetuses. Late fetal deaths may be more common among blacks due to increased adverse outcomes late in pregnancy. Perinatal mortality surveillance may be useful to target interventions that prevent deaths among viable fetuses and reduce racial disparities.

Key words: perinatal mortality, fetal deaths, neonatal deaths, blacks

8:55 *Scott S. Santibanez, W. Sappenfield, V. Haynatzka, D. Barnes-Josiah, K. Schoendorf, S. Iyasu, M. Peck, H. Atrash*

Infant Mortality Disparities in 60 Large U.S. Cities, 1995–1997

Background: Although reducing the U.S. infant mortality rate (IMR) has been a great 20th Century public health achievement, rates vary widely among large U.S. cities, ranging from 4.4 to 15.3 infant deaths per 1,000 live births. We investigated risk factors contributing to these urban disparities.

Methods: Using National Center for Health Statistics 1995–1997 data, we calculated IMRs for U.S. cities with populations $\geq$ 250,000. We used stepwise multiple linear regression to estimate the effects of individual-level factors (race/ethnicity, birthweight < 1,500 g, late or no prenatal care, maternal education < 12 years, maternal age <18 years) and city-level factors (population, geographic region, segregation, median household income and childhood poverty) identified in literature and through descriptive analyses.

Results: Sixty of 64 eligible cities had sufficient data quality for inclusion. Multiple linear regression showed that four individual-level factors — young maternal age, late or no prenatal care, black maternal race, and Hispanic ethnicity — explained 85% of the IMR variation. Of city-level factors added to the model, only midwest ($p = 0.01$) and northeast ($p = 0.02$) regions were significant. The highest rates were seen in these regions. When birthweight < 1,500 g was added to the model, black maternal race and northeast region were no longer significant.

Conclusions: IMR differences between large U.S. cities are predominantly driven by four individual-level factors — teen pregnancy, prenatal care, race and ethnicity. Geographic disparities persist despite adjustment for individual-level factors. Of the individual-level factors, only the effect of black maternal race was not significant when adjusting for birthweight. These findings are being confirmed with multilevel modeling: logistic regression for individual factors and multiple linear regression for city factors.

Key words: urban/city, infant mortality, racial disparities, multilevel regression model

9:15 *Sharon Durousseau, G. Chavez, D. Taylor, K. Marchi, P. Braveman*

Associations between Psychosocial Factors and Intrauterine Growth Retardation — California, 1998

Background: Intrauterine growth retardation (IUGR) increases infant mortality risk. In 1998, a total of 10,314 babies with IUGR were born in California. Preliminary research has suggested associations between psychosocial factors and IUGR. Understanding how psychosocial factors affect IUGR can direct social support interventions.

Methods: We analyzed data from a California population-based survey of new mothers linked with birth certificate data. We defined cases of IUGR as term (>37 weeks gestation) singleton births with birthweight <2,500 grams. All other term singleton births were controls. We calculated odds ratios (OR) with 95% confidence intervals (CI) for the association of IUGR with initial happiness regarding becoming pregnant and a personal control score (calculated from responses to maternal sense of control questions).
Results: Case mothers were more likely to be aged <19 years, to be African-American, to have a history of a low birthweight infant, to have a low pre-pregnancy weight, to be single, and to have less income and education than controls. Among case mothers, 9.9% reported being very unhappy about becoming pregnant compared with 3.7% of controls (OR = 3.15; 95% CI = 1.20, 8.23) and 4.0% had low personal control scores compared with 2.2% of controls (OR = 1.88; 95% CI = 0.25,14.15).
Conclusions: A woman's happiness regarding becoming pregnant was associated with IUGR in this sample. Multivariate analysis is needed to assess this association in relation to other IUGR risk factors. Programs should address psychosocial factors in the context of the prevention of intrauterine growth retardation.

Key words: pregnancy, low birthweight, social, infant, reproductive health

9:35 *Dana C. Crawford, J. Brown, B. Bashor, R. Olney, C. Moore, D. Erickson*
Cluster Investigation of Orofacial Clefts — Dickson County, Tennessee, 1997-2000

Background: Orofacial clefts affect approximately 1 in 1,000 newborns each year with average lifetime costs exceeding $100,000. Specific environmental exposures and genetic variants are associated with the risk for clefting, however, no effective preventions have been established. In June 2000, the Tennessee Department of Health (TDH) requested CDC assistance to evaluate a possible cluster of clefts. Our objectives were limited to calculating county-specific birth prevalence rates and collecting information from case-mothers regarding known and potential clefting risk factors.
Methods: A case was defined as any infant born to a Dickson County resident during January 1997 through October 2000 having an ICD-9-CM 749.00–749.25 coded discharge diagnosis. Cases were confirmed by medical record review. Tennessee lacks a birth defects registry; therefore, expected rates were based on surveillance from Atlanta, Georgia (Metropolitan Atlanta Congenital Defects Program). We interviewed case-mothers (n=15) using the National Birth Defects Prevention Study (NBDPS) questionnaire and collected pertinent family history. We compared responses with those from mothers of infants without birth defects ascertained for the NBDPS in Atlanta matched by race (n=100).
Results: 18 infants met the case definition, giving an observed to expected ratio of 5.0 (95% Confidence Interval: 2.96–7.90). Compared with Atlanta-mothers, case-mothers reported more smoking any time during the 1st trimester of pregnancy (47% vs 10%; p=0.0008) and less periconceptional vitamin use (7% vs 20%; p=0.370).
Conclusions: We confirmed an increased rate of clefting in Dickson County. Compared with a convenient sample, case-mothers reported a statistically significant increase in smoking. Although not significant, case-mothers also reported a decrease in periconceptional vitamin use. The cause of this cluster is unknown. We recommend continued surveillance for clefting and associated risk factors

Key words: cleft palate, cleft lip, birth defects, cluster investigation

9:55 *Melanie F. Myers, L. Zhu, A. Correa, L. Song, R.J. Berry*
Prevention of Birth Defects with Folic Acid Use — China, 1993–1995

Background: Recent progress has been made in the prevention of neural tube defects (NTDs), through maternal use of folic acid. Determining if periconceptional folic acid use can also reduce the risk for non-NTD birth defects could be useful for the development of prevention interventions. Our objective was to evaluate the influence of maternal periconceptional ingestion of 400 μg of folic acid alone on the rate of non-NTD major birth defects identified during a public health campaign in China during 1993–1995.

Methods: Population-based birth defects surveillance included pregnancies of ≥20 weeks gestation for which any external birth defect was diagnosed by six weeks of age. Maternal folic use was ascertained prospectively before knowledge of pregnancy outcome. The rates and relative risk for major external birth defects among offspring of women with singleton pregnancies were calculated according to folic acid use.
Results: Of the 222,314 pregnancies, 5,126 (2.3%) resulted in offspring with external birth defects (1,717 [0.8%] major defects and 3,409 [1.5%] minor defects). Among women who did and did not take folic acid, the rates of offspring with any non-NTD major birth defect were 6.3 and 7.3 per 1000, respectively (RR=0.86, 95% CI=0.78, 0.96). In particular, periconceptional ingestion of folic acid was associated with a reduced risk for cleft lip +/- palate (RR=0.75, CI=0.61,0.92) and imperforate anus (RR=0.50, CI=0.28,0.88).
Conclusions: Our finding that maternal periconceptional use 400 µg of folic acid may reduce the risk of major birth defects other than NTDs provides additional rationale for strengthening and expanding public health campaigns promoting folic acid use to women of childbearing age.

Key words: folic acid, birth defects, surveillance, population-based

10:35 Iatrogenic Diseases. Moderator: William Schaffner

10:40 *Bruno P. Coignard, G. Nguyên, J. Tokars, M. McMillian, L. Mascola, W. Jarvis*
A Cluster of Intra-Operative Deaths in a Liver Transplant Center Associated With the Use of Solvent/Detergent Plasma — California, 2000

Background: Liver transplant (LT) is one of the most common organ transplants in the United States, occurring in 4,700 patients annually. LT patients bleed extensively; pulmonary embolism (PE) is a rare complication. Solvent/Detergent Plasma (SDP) was introduced in 1998 as a virally inactivated alternative to Fresh Frozen Plasma, which often is used during LT. From April 2 to December 15, 1999 (i.e., study period), after switching to SDP, Hospital A noted intra-operative deaths from PE in 6 (20%) of 31 LT patients.
Methods: PE diagnosis was confirmed by hemodynamics, echocardiography, or pathology. We assessed medical history, coagulation parameters, blood product infusion, medications, surgical techniques and personnel in a retrospective cohort of 31 patients during the study period. We calculated incidence density rates of PE per 100 hours of surgery. Poisson regression was used to generate adjusted risk ratios (ARR); blood product quantities were analyzed on a logarithmic scale.
Results: PE incidence was 2.25 per 100 hours during the study period, significantly higher than during the previous year (6/268.7 vs 0/178, RR=undefined, p=0.04). Incidence was 0 (0/84), 2.25 (2/89), or 4.18 (4/95.7) when 0–2, 3–9, or 10 units of SDP were received, respectively (p=0.06 for trend). By multivariate analysis, the strongest independent predictors of PE incidence were the quantity of SDP received (ARR=8.5 for a Log 1 increase, 95% Confidence Interval [CI]=1.6–85.1) and a pre-operative hypercoagulable state (ARR=28.9, 95% CI=3.4–342.9).
Conclusions: Use of SDP is associated with death from PE in LT. After use of SDP in LT was discontinued in the United States, no similar events were reported. These results emphasize the importance of post-marketing surveillance in detecting rare effects of new medicines.

Key words: plasma/adverse effects, liver transplantation, risk factors, United States

11:00 *Lorraine N. Alexander, M. Kellum, S. McAllister, B. Kupronis, M. Pearson*
Sternal Site Infection Following Coronary Artery Bypass Graft Surgery — New York, 1999–2000

Background: Over 500,000 coronary artery bypass grafts (CABG) procedures are performed in the United States every year. Between July 9, 1999 through January 5, 2000 (epidemic period), 10 patients at one hospital (Hospital A) developed deep sternal, methicillin-resistant *Staphylococcus aureus* (MRSA) surgical site infection (SSI) following CABG; eight of the SSIs were due to a single MRSA strain (Strain A).

Methods: To identify risk factors for SSI, we conducted a case-control study. A case-patient was defined as any patient who developed a Strain A MRSA SSI following CABG at Hospital A during the epidemic period. Controls were patients who underwent CABG at Hospital A during epidemic period but did not develop SSI. Nasal cultures were obtained on 110 perioperative personnel to assess MRSA carriage. Isolates were typed by pulse-field gel electrophoresis.
Results: Eight patients met our case definition. All required surgical debridement; three (38%) died. Cases were more likely than controls to be placed on cardiopulmonary bypass (7/8 vs. 20/36, OR=5.6, 95% CI=0.62–50.3, p=0.09), particularly pump A (6/7 vs. 3/20, OR=34, CI= 2.9–393, p <0.01), and to require reoperation for noninfectious complications (3/8 vs. 2/34, OR=10.2, 95% CI=1.34–77, p=0.03). Use of internal mammary artery grafts was protective (2/7 vs. 24/32, OR=0.13, 95% CI=0.01–1.05, p=0.03). In multivariate analysis, only pump A was associated with cases (OR= 33, 95% CI= 4.5–241). One HCW was colonized with the outbreak strain, but was not associated with cases (OR=3, 95% CI=0.48–19.3).
Conclusions: These findings suggest that a specific bypass pump was associated with increased risk of MRSA infection following CABG. This is the first study to implicate cardiopulmonary bypass as a risk for sternal SSI.

Key words: methicillin-resistant *Staphylococcus aureus*, nosocomial, coronary artery bypass grafts, surgical-wound

11:20 ***Francisco Alvarado-Ramy, M. Kuehnert, A. Panlilio, S. Banerjee, J. Alonso-Echanove, M. Pearson and the Transfusion Reaction Study Group***
A Multi-State Investigation of Transfusion Reactions Among Recipients of Leukocyte-Reduced Red Blood Cell Units — United States, 2000

Background: Filtration of blood products to remove white blood cells (i.e., leukoreduction) reduces the frequency of transfusion reactions. A federal blood products advisory committee has recommended universal leukoreduction; by 2000 an estimated 50% of U.S. blood products were leukocyte-reduced (LR). In February 2000, the American Red Cross (ARC) received reports of severe back pain occurring during transfusion of LR red blood cells (RBCs).
Methods: To assess risk factors for reactions, we conducted a case-control study. A case was defined as an LR-RBC transfusion from January 10 through May 4, 2000, during which back pain occurred. Controls, defined as LR-RBC transfusions during which back pain did not occur, were randomly selected from the same facilities as cases.
Results: Twenty-nine cases were identified in 18 patients and five states. Three patients required hospitalization; none died. Fifteen (83%) case-patients had cancer or chronic hematologic conditions. Besides back pain, patients experienced dyspnea (35%), chest pain (28%), chills (14%), and seizure (3%). Laboratory tests for blood group incompatibility were negative. From multivariate analysis, use of Filter A for leukoreduction was a risk factor for reactions (OR=92, 95% CI=16–999, p<0.001). Filter A was introduced to the market in October 1999 and was one of three leukoreduction filters used by ARC. The incidence of reactions from October 1999 through April 2000 was higher with use of Filter A than with other filters (29/145,315 units vs. 0/617,829 units, p<0.0001).
Conclusions: Use of Filter A for leukoreduction may be associated with an increased risk of transfusion reactions. The etiology of these reactions has not been elucidated. Since ARC discontinued use of the implicated filter, no further reactions have been reported.

Key words: red blood cell transfusion, blood component removal, filtration, leukocytes, back pain, adverse effects

11:40 ***John A. Painter, Y. Hutin***
Unsafe Injection Practices — Niger, 2000

Background: Unsafe injection practices transmit bloodborne pathogens on a large scale worldwide. To better direct prevention efforts in Niger, we assisted the Ministry of Health in conducting an assessment of injection safety in August 2000.

Methods: We conducted interviews and observations of injection practices in a sample of health clinics in Niger. First, eight clusters were selected from 25 regions with a probability proportional to population size. Second, 10 clinics were randomly selected within each cluster. Information was collected through an inventory of available equipment, structured observations, and staff interviews.

Results: Of the 80 clinics selected, 79 provided partial or complete responses. During the previous year, clinics reported insufficient disposable syringes at 24 (46%) of 52 clinics and insufficient energy for sterilization at 13 (25%) of 52 clinics. We observed attempts to inject patients with nonsterile equipment in 5 (11%) of 45 clinics before tactful interruption by the assessment team. Contaminated sharps waste were observed in open containers in 73 (95%) of 77 clinics and in the environment surrounding 43 (61%) of 70 clinics. Health-care workers reported experiencing at least one needle-stick injury in the previous year at 56 (72%) of 77 clinics.

Conclusions: Lack of supplies, unsafe behaviors, and poor sharps waste management lead to unsafe injection practices in Niger, exposing patients, health-care workers, and the community to bloodborne infections. A coordinated strategy to increase supplies of both disposable syringes and fuel sources for sterilizers, train health-care workers, and encourage proper disposal of sharps is required to prevent injection-associated infections in Niger.

Key words: developing countries, bloodborne pathogens, infection control, safety

12:30 Poster Session No. 2 — Posters on Display

Nosocomial Infections

P1. ***S. Deblina Datta, S. Goldstein, P. Salama, S. Cotter, D. Culver, H. Wilson, E. Eckstein, F. Smith, J. Johnson, M. Alter***

Hepatitis C Virus Transmission Among Patients at a Chronic Hemodialysis Center — Ohio, 2000

Background: Chronic hemodialysis (HD) patients have an increased risk for hepatitis C virus (HCV) infection, but little is known regarding modes of transmission in the HD setting. We investigated a cluster of HCV infections among chronic HD patients at Center A that occurred during December 1998–December 1999.
Methods: We reviewed medical records to identify all case-patients, defined as HD patients at Center A who seroconverted to anti-HCV-positive during the 13-month study period. We conducted a matched case-control study using anti-HCV-negative control-patients dialyzed at the same time as case-patients to identify exposures associated with HCV transmission (e.g., sharing staff, equipment, or procedures with chronically infected patients). We interviewed staff and patients and observed infection-control practices.
Results: Of 110 HD patients, 35 (32%) were chronically HCV-infected, and 5 of 75 susceptible patients seroconverted (attack rate 6.7%). Compared with control-patients, case-patients were similar in age, sex, and race. The only exposure significantly associated with infection was receiving HD on a machine immediately following a chronically infected patient, which occurred in 27% of case-patients' sessions compared with 16% of control-patients' sessions (matched odds ratio=2.6, 95% confidence interval 1.03–6.4). Disinfection protocols were adequate for internal pathways of HD machines, however; equipment externally attached to machines (e.g., priming buckets) and other supplies used on chronically infected patients often were not properly cleaned and disinfected before use on susceptible patients.
Conclusions: HD staff should strictly observe infection-control precautions specifically designed for HD centers. In particular, any items used for an HD patient should be disposed of, dedicated for use only on a single patient, or cleaned and disinfected before use on another patient.

Key words: hepatitis C, hemodialysis, nosocomial infections, disease outbreak, infection control

P2. ***Annette H. Sohn, D. Garrett, R. Sinkowitz-Cochran, L. Grohskopf, P. McKibben, G. Levine, B. Stover, J. Siegel, W. Jarvis, and the Pediatric Prevention Network***

Prevalence of Nosocomial Infections in Neonatal Intensive Care Unit Patients: Results from the First National Point-Prevalence Survey — United States, 1999

Background: It is estimated that over 20% of patients admitted to neonatal intensive care units (NICU) develop nosocomial infections during their hospitalization — resulting in prolonged hospitalizations, morbidity, mortality, and heavy economic burdens. However, a national survey of nosocomial infections in NICU patients in the United States has not been conducted previously to characterize the distribution of infections, associated risk factors, and target areas for prevention.
Methods: We conducted a point prevalence survey of nosocomial infections in 29 Pediatric Prevention Network NICUs. All NICU patients present on the survey date (August 4, 1999) were included. Data were collected on NICU and patient demographics, underlying diagnoses, therapeutic interventions/treatments, infections, pathogens, and outcomes.
Results: Of 827 patients surveyed, 94 (11.4%) had 116 NICU-acquired infections: bloodstream (N=61; 52.6%), lower respiratory tract (N=15; 12.9%), ear-nose-throat (N=10; 8.6%), or urinary tract infections (N=10; 8.6%). Infants with nosocomial infections were significantly older (median: 36 vs 16 days; $p<0.001$) and of lower birthweight (median: 1006 vs 1589 gm; $p<0.001$). Most common pathogens were coagulase-negative

staphylococci (N=37; 31.6%) and enterococci (N=12; 10.3%). Patients with central intravascular catheters (RR=3.81, CI 2.32–6.25; p<0.001) or receiving total parenteral nutrition (RR=5.72, CI 3.45–9.49; p<0.001) were at greater risk of bloodstream infection. The median duration of hospital stay for those with nosocomial infections was significantly longer than for those without (median: 88 vs 32 days; p<0.001). Those with infections had a higher mortality rate, but this was not statistically significant.

Conclusions: This is the first multi-center study to assess the prevalence of and risk factors for NICU-acquired infections in the United States, and emphasizes the importance of developing interventions to prevent these infections in this fragile at-risk population.

Key words: neonatal intensive care, cross infection, prevalence, prematurity

P3. ***Michael S. Phillips, J. Cesareo, E. Hazel, J. Kornblum, L. Kornstein, M. Layton, M. Pearson***
***Alcaligenes xylosoxidans* Infections at an Extended Care Facility — New York City, 1999–2000**

Background: *Alcaligenes xylosoxidans,* a gram-negative bacteria, rarely causes human infection. During a 15-month period, several patients at an extended care facility (Facility A) acquired *A. xylosoxidans* bloodstream or pulmonary infections.

Methods: We conducted a matched case-control study to identify risk factors for infection. A case-patient was defined as a Facility A patient with *A. xylosoxidans* infection from July 1999 to October 2000. Controls were patients without *A. xylosoxidans* infection during the study period. Three controls were matched to each case-patient by hospital ward and date of diagnosis of *A. xylosoxidans* infection. Environmental cultures of hospital water and soap were obtained. Pulsed field gel electrophoresis (PFGE) was performed on available isolates.

Results: Twelve cases of *A. xylosoxidans* infection (10 bloodstream infections and two pneumonias) were identified. Five case-patients were located on one hospital ward; the other case-patients were located on three different wards. Four case-patients died during the study period. Case-patients and controls were similar in mean age (65 years, SD=17 years vs 67 years, SD=18 years, p=0.78) and mean length of stay (178 days, SD=140 days vs 308 days, SD=537 days, p=0.41). Case-patients were more likely to have central venous catheters (CVC) than controls (9/12 (75%) vs 4/36 (11%), matched OR=17.8, p=0.00002). No other risk factors were associated with illness. Cultures of hospital water and soap did not grow *A. xylosoxidans.* PFGE analysis of five available isolates showed they were unrelated.

Conclusions: *A. xylosoxidans* is an unusual cause of nosocomial infection. At Facility A, CVC use was associated with *A. xylosoxidans* bloodstream infection. Differing PFGE patterns suggest the establishment of *A. xylosoxidans* within the hospital flora and possibly the emergence of a new nosocomial pathogen.

Key words: *Alcaligenes xylosoxidans*, nosocomial infection, central venous catheter

P4. ***Lisa A. Grohskopf, R. Sinkowitz-Cochran, D. Garrett, A. Sohn, P. McKibben, G. Levine, J. Siegel, B. Stover, W. Jarvis, and the Pediatric Prevention Network***
A National Point-Prevalence Survey of Pediatric Intensive Care Unit-Acquired Infections — United States, 1999

Background: Intensive care unit-acquired infections are associated with excess morbidity, mortality, and healthcare costs. Most literature pertaining to these infections focuses on adults. Pediatric intensive care unit (PICU) patients are at high risk of infection, due to extensive use of invasive procedures. Few national data exist on the prevalence of PICU-acquired infections.

Methods: Thirty-one Pediatric Prevention Network hospitals participated in a point-prevalence survey on August 4, 1999. Data were collected for all PICU inpatients on that date and included demographic characteristics, infections, antimicrobial use, therapeutic devices and procedures, and outcomes.

Results: Data were reported for 512 patients in 35 PICUs. The median age was 2.2 years (range 1 day–35.4 years). Approximately 66% were receiving antimicrobials on the survey date; 58% had surgery during their admission. Seventy-five PICU-acquired infections were reported in 61 (11.9%) patients. The most frequent sites of infection were bloodstream (31 [41.3%]), pneumonia/lower respiratory tract (17 [22.7%]), urinary tract

(10 [13.3%]), or skin/soft tissue (6 [8.0%]). Microbiological studies were performed in 72 (96.0%) infections. The most frequent pathogens were coagulase-negative staphylococci (16 [21.3%] infections), *Candida* spp. (13 [17.3%] infections), enterococci (10 [13.3%] infections), *Staphylococcus aureus* (9 [12.0%] infections), or *Pseudomonas aeruginosa* (8 [10.7%] infections). Age-adjusted risk factors for PICU-acquired infection included use of a central intravenous catheter (relative risk [RR]=4.1, 95% confidence interval [CI]=2.4–7.1), arterial catheter (RR=2.4, 95% CI=1.5–3.9), parenteral nutrition (RR=5.5, 95% CI=3.6–8.5), or mechanical ventilation (RR=3.9, 95% CI=2.2–6.8). PICU-acquired infection was associated with increased age-adjusted risk of death (RR=3.4, 95% CI=1.5–7.6).

Conclusions: This first national, multi-center study documents the prevalence of PICU-acquired infections, and provides baseline national data which can be used to monitor secular trends and assess preventive interventions.

Key words: pediatric intensive care, cross infection, bloodstream infection, mortality

Children's Health

P5. *Thomas M. Verstraeten, J. Mullooly, H. Izurieta, A. Jumaan, J. Seward, R. Chen, and the Vaccine Safety Datalink Team*

Varicella Breakthrough in Asthmatic Children — West Coast, United States, 1995–1999

Background: A 1996 varicella outbreak among 148 children in a daycare center observed a 7-fold increased rate of vaccine failure (breakthrough disease) among asthmatic children. As varicella vaccine coverage is increasing and an estimated 4.8 million children in the US suffer from asthma, we conducted a retrospective cohort study to assess the association between asthma and breakthrough varicella.

Methods: A cohort of children under 13, vaccinated once against varicella from 1995 to 1999, was selected from automated vaccination records of two managed care organizations (MCOs), located on the West Coast of the US. Asthmatic children were identified using automated clinic and pharmacy records. Cases of breakthrough varicella, defined as chickenpox in vaccinated children, were identified from automated clinic records. Cox proportional hazards models were used to compare the risk of breakthrough varicella between asthmatic and non-asthmatic children. The estimates were adjusted for year of birth, age at vaccination, and use of asthma medication.

Results: In a cohort of 267,991 children vaccinated against varicella, 55,038 asthmatic children were identified. Breakthrough varicella cases occurred among 355 asthmatic and 747 non-asthmatic children. The adjusted relative risk for breakthrough varicella among asthmatics compared to non-asthmatics was 1.26 (95% Confidence Intervals (CI): 1.07–1.49) at one MCO and 2.09 (95% CI: 1.25–3.49) at the other.

Conclusions: An increased risk of breakthrough varicella among asthmatic children was observed. Further analyses will evaluate whether higher ascertainment rates of varicella disease among asthmatic children have biased these analyses. In the absence of such bias, further studies of varicella vaccine efficacy among asthmatic children are indicated to assess the need for modifying vaccination practices among asthmatics.

Key words: Varicella vaccination, chickenpox, asthma, cohort study

P6. *Perpetua S. Gonzaga, T. Karapurkar, C. Murphy, D. Schendel*

Sociodemographic Risk Factors Among Children with Autism — Metropolitan Atlanta, 1996

Background: Autism, a serious neurobehavioral disorder typically associated with other developmental disabilities (DD), affects up to five per 1,000 US children. During 1991–1999, children receiving educational services for autism increased 14-fold. Because little is known about its causes, and reports are inconsistent about how sociodemographic factors (SDF) affect the risk for autism, we conducted a case-control study of SDF and autism using a sample of cases from a population-based surveillance program.

Methods: Cases comprised 541 children with autism, born in five metropolitan Atlanta counties from 1986 through 1993, and identified at 3–10 years of age in 1996 by CDC's Metropolitan Atlanta Developmental

Disabilities Surveillance Program. Controls were Atlanta-born children without known DD, randomly selected from birth certificates and frequency matched to case-children by year of birth. We obtained sociodemographic variables from birth certificates and 1990 census tract data for birth residence. We performed univariate and multivariate analyses using logistic regression (SAS).

Results: Preliminary results indicate that, case-children were more likely than control-children to be male (adjusted odds ratio [AOR]=3.3, 95% confidence interval [CI]=2.5–4.4), a multiple birth (AOR=4.0, 95% CI=1.7–9.1), or African-American (AOR=1.7, 95% CI=1.2–2.4), and their mothers were more likely to be ≥35 years (AOR=1.7, 95% CI=1.1–2.7), have one previous live-birth (AOR=1.5, 95% CI=1.1–2.0), or of higher income (AOR=2.3, 95% CI=1.5–3.5). However, specific SDF differed among children with isolated autism (autism with no other DD) and non-isolated autism (autism plus other DDs).

Conclusions: Autism is significantly associated with certain SDF. Further work is required to determine how SDF affect the risk for autism, including how specific SDF differentially affect the risk for non-isolated versus isolated autism.

Key words: Autism, sociodemographic factors, case-control study, epidemiology

P7. *Robert V. Gibbons, U. Parashar, R. Holman, E. Belay, R. Maddox, K. Powell, L. Schonberger*
The Epidemiology of Kawasaki Syndrome — Georgia, 1997–1998: Analysis of Hospital Discharge Data

Background: Kawasaki Syndrome (KS) is the leading cause of acquired heart disease among children in the United States; its etiology is unknown. The epidemiology of KS in Georgia has not previously been described.

Methods: Clinical records were reviewed for physician-diagnosed KS patients (ICD-9-CM code 446.1) identified in Georgia hospital discharge records, 1997–1998. A confirmed KS case was defined according to CDC's KS surveillance criteria. Patients who did not meet confirmed case criteria, but who had fever and coronary artery aneurysms or dilatations, were classified as having atypical KS.

Results: During 1997–1998, 233 discharge records representing 218 patients were identified; 12 (5%) patients had multiple hospitalizations. Clinical record reviews were completed for 182 (83%) of the patients; 17% of patients' charts were unavailable. There was sufficient data to classify 175 (80%) patients; 125 (71%) met the criteria for confirmed KS, and four (2%) met the criteria for atypical KS. The median age of confirmed KS patients was 32 months, 71 (57%) were male, 65 (52%) were black, and 43 (34%) were white. For the 99 (80%) confirmed KS case children <5 years of age, the incidence of KS was at least 8.6 per 100,000. Of 113 (90%) confirmed KS patients with echocardiogram reports available, 12% had aneurysms or dilations of the coronary arteries. IVIG was given to 98% of patients. Of the 46 patients who did not meet the criteria for either confirmed or atypical KS, 28 (60%) were lacking only one of the principal criteria, and five (11%) had a remote history of KS.

Conclusions: At least 73% of patients discharged with physician-diagnosed KS had confirmed or atypical KS. In Georgia, the incidence of KS falls within the range of values found in other large population-based studies in the continental United States.

Key words: Kawasaki disease, mucocutaneous lymph node syndrome, vasculitis

Vector-Borne Diseases

P8. ***Candace L. McCall, A. Cums, J. Olson, L. Rotz, T. Treadwell, J. Childs***
Epidemiologic Characteristics of an Outbreak of Tick-borne Disease at Fort Chaffee, Arkansas, and Comparison of Two Diagnostic Assays for Spotted Fever Group Rickettsia

Background: Spotted fever group *Rickettsia* (SFGR) is a group of potentially fatal tick-borne diseases that include *Rickettsia ricketsii*, the agent of Rocky Mountain spotted fever. *Ehrlichia chaffeensis* and *E. phagocytophila* cause similar illness. We examined epidemiologic characteristics of an outbreak of tick-borne illness at Fort Chaffee, Arkansas, 1997. The efficacies of two serologic tests to detect SFGR were also compared.
Methods: We collected sera and questionnaires from 1067 Army Guard personnel who trained at Fort Chaffee, May–June, 1997; paired sera were provided by 93 guardsmen. Sera were tested for antibodies to *R. ricketsii* (SFGR), *E. chaffeensis, and E. phagocytophila* by indirect immunofluorescent antibody (IFA) assay. A new enzyme immunoassay (EIA) was used to test sera for antibodies to SFGR.
Results: Sera from 162 guardsmen (15.2%) had positive titers to one or more tick-borne agents. The primary risk factor for having both a positive serum sample and a clinically compatible illness was finding >10 ticks on the body (relative risk (RR) =2.9, 95% confidence interval (CI): 2–4.1, p<.0001). Doxycycline use and rolling up sleeves were protective. Of 93 guardsmen that provided paired serum samples, 33 (35%) seroconverted to SFGR: 28 (85%) by EIA alone, 4 (12%) by both IFA and EIA, and 1(3%) by IFA alone. Persons with EIA seroconversion were significantly more likely to report illness than seronegative persons (RR= 3.5, 95% CI=2.3–5.4, p<.0001). Persons with IFA seroconversion were no more likely to report illness (RR=1.6, 95%CI=0.3–9.3, p=. 06).
Conclusions: Current military guidelines recommend rolling down shirtsleeves during training exercises; this practice should be re-evaluated. The EIA test seems more sensitive than IFA when detecting SFGR, and previous investigations that used IFA to evaluate infection at Fort Chaffee may have underestimated the risk for tick-borne illness due to SFGR. More research is needed to examine the etiologic agent of disease and differences between the serologic tests.

Key words: ehrlichiosis, rickettsial infections, military, rocky mountain spotted fever, tick-borne diseases

P9. ***Steven R. Hinten, K. Julian, T. McCarthy, M. Layton, F. Mostashari, M. Kacica, D. Graham, J. Hadler, L. Petersen, B. Biggerstaff, A. Marfin***
West Nile Virus Returns: Results of Serosurveys in Three Northeast U.S. Communities, 2000

Background: In 2000, 10 persons with West Nile virus (WNV) encephalitis or meningitis were reported from Staten Island (SI), NY. However, data suggest <1% of WNV-infected persons develop these complications. We conducted population-based serosurveys in SI and two other counties with intense WNV epizootic activity to estimate human WNV infection prevalence and risk factors for infection.
Methods: Two-stage, household-based cluster sampling was performed for all of SI and portions of Suffolk County, NY (SUF), and Fairfield County, CT (FAI). Persons ≥12 years old were interviewed, using standardized questionnaires, and asked for a blood sample for WNV IgM testing.
Results: A total of 2441 persons participated from 1989 (38.7%) of 5141 selected households. The IgM prevalence was 0.46% in SI (4/877; Confidence Interval [CI]: 0.18–1.17%), 0.24% in SUF (2/833; CI: 0.07–0.87%), and 0% in FAI (0/731; CI: 0.0–0.52%). The six recently infected persons did not differ from uninfected persons by age, gender, presence of fever, or use of personal protective measures. Using these data, we estimate 1901 (CI: 744–4835) infections occurred in SI (population: 413,280). Based on 10 reported cases of severe WNV illness in SI, the clinical:subclinical infection ratio was 1:190 (CI: 1:74–1:484). In SUF, we estimate 288 (CI: 84–1044) infections occurred among the 120,000 people in the serosurvey area, although no cases of severe WNV illness were reported.
Conclusions: We estimate greater than 2000 human infections likely occurred in these study areas alone. A substantial number of subclinical infections occurred in SUF despite no reports of severe WNV illness.

Enhanced ecological surveillance and public health intervention is needed when intense epizootic activity is detected, even in the absence of severe neurologic disease in humans.

Key words: West Nile virus; flavivirus; arbovirus; encephalitis; seroprevalence; data collection; cluster sampling; epidemiology

P10. ***Kathleen G. Julian, A. Marfin, M. Eidson, S. Hinten, J. Miller, E. Bresnitz, M. Bunning, L. Petersen, and the Arbo-NET Surveillance Group***

Counting Crows: Crow Mortality as a Sentinel for West Nile Virus Disease in Humans — Northeastern United States, 2000

Background: In 1999, West Nile virus (WNV) caused human encephalitis and high crow mortality in metropolitan New York City. For WNV surveillance in 2000, eastern U.S. counties received reports of crow deaths from the public, collected and tested crows for WNV infection, and actively sought cases of severe WNV disease in humans. Although surveillance detected a widespread WNV epizootic, the level of epizootic activity that would predict human infections was unknown. To identify epizootic predictors for WNV disease in humans, crow mortality data from all 105 counties in Connecticut, Massachusetts, New Jersey, and New York were analyzed.

Methods: For each week in each county, the densities per area of dead crows and WNV-infected dead crows were calculated. Various threshold densities were modeled for their ability to predict WNV disease in humans.

Results: Surveillance identified 25,304 dead crows and 3,664 WNV-infected dead crows. Nineteen persons with WNV disease were reported from eight counties. A threshold of 0.05 dead crows/mi^2/week was exceeded in 26 counties; in seven (27%) of these counties, a case of human disease first occurred $\geq$six weeks later. In the 79 counties in which this threshold was not exceeded, no human cases were reported. A threshold of 0.01 WNV-infected dead crows/mi^2/week was exceeded in 35 counties; in six (17%) of these counties, a case of human disease first occurred $\geq$four weeks later.

Conclusions: High densities of dead crows and WNV-infected dead crows indicate increased risk of WNV disease in humans and warrant enhanced vector control. In counties not exceeding these epizootic thresholds, humans appear to have little risk of WNV disease. Surveillance for crow mortality allows timely targeting of interventions to protect public health.

Key words: West Nile virus, crows, sentinel surveillance, arbovirus infections, Flaviviridae, encephalitis viruses

P11. ***Daniel A. Singer, S. Dusza, N. Komar, M. Cetron***

Imported Animals and International Travelers as Potential Sources of West Nile Virus — New York, 1999

Background: In 1999, West Nile Virus (WNV) was documented for the first time in the Western Hemisphere, during an outbreak in New York City (NYC). To date, the source of WNV has not been determined. We developed a novel model that quantitatively assesses likelihood for introduction of WNV by international travelers and imported animals. Developing new strategies for preventing emerging diseases requires innovative approaches for identifying the source of imported pathogens.

Methods: Data on number and country of origin for international arrivals (travelers and animals) to metropolitan NYC during a one-year period were collected. A model was developed that weighted each arrival by two factors: (a) the "host competence index": an experimentally derived value which multiplies the host specific mean viremia level by the number of days that level is met or exceeded to describe the ability of an animal to serve as a reservoir for WNV; and (b) the "geographic homology score": the homology of the nucleotide sequence of the WNV strain for each country of origin to the NYC outbreak strain expressed as a percent. Analysis was performed according to country of origin and class of animal, with immunocompromised and immunocompetent humans analyzed separately.

Results: Twenty-three percent of 4,850,090 arriving humans and 4.3% of 2,873,144 imported animals were from one of the 59 countries which have reported WNV. The three species with the highest likelihood of

having introduced WNV were immunocompromised humans (weighted score=287.6), followed by birds (193.2) and amphibians (115.4). The top ten likely WNV source countries included nations in the Middle East, Europe, Asia, and Africa.

Conclusions: Statistics on animal and human migration can be combined with genetic homology and host competence data to model the risk of disease importation. Humans, particularly immunocompromised travelers, may represent a potentially under-appreciated risk for introduction of WNV to America. With refinements, this model could improve risk assessment, focus research and target preventive interventions.

Key words: West Nile Virus, animals, commerce, immunocompromised host, travel

Fungal and Parasitic Diseases

P12. *Maria V. Cano, G. Ponce-de-Leon, S. Tippen, M. Lindsley, M. Warwick, R. Hajjeh*
Blastomycosis in Missouri, 1992–1999: Epidemiology and Risk Factors for Endemic Disease

Background: Blastomycosis, caused by the fungus *Blastomyces dermatitidis*, is endemic in the central and southeastern United States. Information on incidence and risk factors for endemic blastomycosis is limited. Within the past 5 years, six fatal cases of blastomycosis were reported in southeastern Missouri, prompting this study.

Methods: We reviewed hospital discharge data and records of culture-confirmed blastomycosis reported by the Missouri Reference Laboratory from 1992 to 1999. To evaluate risk factors, we performed a case-control study among southeastern Missouri residents. A case was defined as a positive culture of *B. dermatitidis* or histopathology consistent with blastomycosis. For each case-patient, four controls were matched by sex, age-group and city.

Results: From 1992 to 1999, 93 cases were identified, for an annual incidence of 0.2/100,000 population for Missouri. Annual incidence in southeastern Missouri was 1/100,000 population; the incidence was highest in Mississippi County (12/100,000) and was much higher among blacks in this county (43.2/100,000). Median time from onset of symptoms to diagnosis was 49 days (range 6–200 days); mortality rate was 22%. The case-control study enrolled 24 patients and 94 controls. Independent risk factors for blastomycosis were black race (odds ratio [OR] 28, 95% confidence interval [CI] 2.8–281) and history of pneumonia (OR 32, CI 3.8–266). No environmental exposures or socioeconomic factors were significantly associated with increased risk.

Conclusions: The incidence rate of blastomycosis in southeastern Missouri is comparable to rates in other endemic-disease areas. The increased risk of disease among blacks may be related to genetic predisposition, but further studies are needed. Greater awareness of blastomycosis will lead to earlier diagnosis and may prevent further morbidity and mortality.

Key words: blastomycosis, endemic diseases, risk factors, epidemiology, Missouri

P13. *Margaret Mary Cortese, T. Holtz, S. Gerber, R. Jones, A. Lopez, T. Slom, W. Chaicumpa, S. Johnson, B. Herwaldt*
Outbreak of Eosinophilic Meningitis Caused by *Angiostrongylus cantonensis* Among Travelers to Jamaica, 2000

Background: The rat lungworm *Angiostrongylus cantonensis* (AC) is the most common cause of eosinophilic meningitis worldwide, but few outbreaks have been reported. Humans become infected with AC by consuming larvae in inadequately cooked snails, slugs, or freshwater fish, or by eating produce contaminated by snails or slugs. In May 2000, an outbreak of eosinophilic meningitis occurred among young adults, predominantly from Chicago, who had traveled together to Jamaica.

Methods: We conducted a retrospective cohort study. A case of eosinophilic meningitis was defined clinically as headache and at least one of neck stiffness/pain, hyperesthesias, paresthesias, photophobia, or vision change, within 35 days of returning from Jamaica.

Results: Twelve (52%) of the 23 trip participants met the case definition of eosinophilic meningitis. Nine (75%) of 12 patients experienced hyperesthesias or paresthesias. Median time from departing Jamaica to the onset of illness was 11 days (range: 6–31days). Nine patients were hospitalized; eight had cerebrospinal fluid eosinophilia of at least 10%. Eight patients experienced headaches for at least one month. To date, antibodies to AC have been detected in the serum of five of seven hospitalized patients. No members of the cohort reported consuming snails, slugs, or undercooked fish. Eating at one restaurant on a particular occasion was associated with illness (risk ratio undefined; p = 0.001, two-tailed Fisher exact) and could explain all 12 cases.
Conclusions: The exact mode of transmission of AC during this meal has not been confirmed, and investigation of the transmission cycle in Jamaica is continuing. These results, together with increased surveillance for this illness, will better define the public health importance of AC in Jamaica.

Key words: *Angiostrongylus cantonensis,* eosinophilia/cerebrospinal fluid, meningitis/parasitology

P14. *Timothy H. Holtz, F. Onikpo, M. Lama, F. Cokou, S. Kachur*
Malaria Microscopy in Eight Secondary Health Care Facilities — Ouémé Department, Bénin, 2000

Background: Malaria kills 2 million children in Africa every year. Diagnosis and treatment of malaria in sub-Saharan Africa is usually based on patient history and physical examination. Malaria microscopy, in locales with resources to support it, could reduce excess antimalarial drug use, thereby reducing costs and potentially slowing the development of drug resistance. We conducted a study to examine the use of microscopy services in case management and determine the accuracy of blood smear diagnosis performed in laboratories.
Methods: We included patients of all ages seen during outpatient visits in October 2000 at eight secondary health care facilities where malaria microscopy was available in Ouémé Department, Bénin. Using health cards and laboratory records, we collected data on symptoms, diagnosis, treatment, and malaria blood smear results. All malaria smears were subsequently read by two independent expert microscopists.
Results: Among 629 patients, 260 (41.3%) were referred for a malaria blood smear, and 187 (29.7%) actually completed one. Among 219 children under 5 years of age, current fever or history of fever (199, 90.9%) was not associated with being referred for a blood smear (RR=1.1, 95% CI 0.9–1.3) or being prescribed an antimalarial medication (RR=1.0, 95% CI 0.9–1.1). Overall, 67.3% of patients with negative blood smears were prescribed an antimalarial drug. Sensitivity, specificity, and predictive value positive of the laboratory technicians were 96.7%, 39.4%, and 48.4%, respectively.
Conclusions: Malaria microscopy did not effectively contribute to the management of febrile illness at these health facilities. The accuracy of blood smear diagnosis for malaria by technicians was poor. Before the potential benefits of microscopy can be realized, technician accuracy and clinical utilization should be improved.

Key words: malaria, microscopy, antimalarial drug, sensitivity, specificity

P15. *Els Mathieu, D. Levy, F. Veverka, M. Parish, J. Sarisky, N. Shapiro, S. Johnson, L. Xiao, Y. Lee, M. Arrowood, M. Kolczak, R. Lee, J. Jones*
A *Cryptosporidium parvum* Outbreak at a Private Swimming Club — Delaware County, Ohio, 2000

Background: The chlorine-resistant parasite *Cryptosporidium parvum* is an increasingly recognized cause of diarrheal outbreaks at recreational water facilities. In August 2000, the Ohio Department of Health requested assistance to investigate a cryptosporidiosis outbreak, possibly linked to a swim club.
Methods: We collected descriptive case information and conducted two case-control studies: a community-based study to examine potential sources of the outbreak and a study restricted to Swim Club A members to identify pool-related risk factors. We conducted an environmental investigation and analyzed stool specimens, pool water, and sand filter samples.

Results: We identified more than 700 clinical case-patients (151 laboratory-confirmed). The median age of laboratory-confirmed cases was 6 years (range: 1–46). Mean duration of illness was 7 days. Symptoms included diarrhea (91%), loss of appetite (87%) and abdominal cramps (83%). Ill persons were 42 times more likely to have swum in pool A than healthy persons from the community (95% confidence interval [CI] 12.3–144.9). Ill persons were more likely than healthy club members to have had exposure to pool water via their mouth (odds ratio [OR] 5.1; 95% CI 2.1–12.5) or to pool sprinklers (OR 2.5; 95% CI 1.3–4.7). Fecal accidents at the pool were documented. Some case-patients were co-infected with two *Cryptosporidium parvum* genotypes (human and bovine), a finding not previously documented. Both strains were also found in the pool's sand filter. Records indicated that the pool met local health regulations.
Conclusions: This large cryptosporidiosis outbreak, associated with a recreational water facility, underscores the need for concerted action to improve public health policies, operations, and practices for recreational water facilities, and to enhance education of pool patrons and staff regarding the potential for disease transmission.

Key words: cryptosporidium, swimming pools, disease outbreaks, parasites

Wednesday Afternoon — April 25, 2001

1:30 Sexually Transmitted Diseases. Moderator: Judith N. Wasserheit

1:35 *Megan E. Reller, S. Olsen, A. Kressel, T. Moon, K. Kubota, M. Adcock, S. Nowicki, E. Mintz*
Water, Food, and Now Sex: An Outbreak of Typhoid Fever Transmitted Through Sexual Contact — Ohio, Kentucky, and Indiana, 2000

Background: Typhoid fever is a serious systemic illness caused by *Salmonella* Typhi. Infection usually occurs through ingestion of water or food contaminated with human feces. Most of the 400 cases reported annually in the United States are acquired abroad. In August 2000, the Ohio Department of Health notified CDC of a cluster of men with typhoid fever who had not traveled out of the country.
Methods: Active hospital and laboratory surveillance for typhoid fever was initiated. State health departments nationwide were notified via the foodborne outbreak and PulseNet listservs. We reviewed medical records, interviewed patients, and collected specimens for culture and subtyping by pulsed-field gel electrophoresis (PFGE). We defined an acute typhoid-like illness (temperature ≥103°F for ≥3 days plus ≥3 defined symptoms) as a probable case, and isolation of *S.* Typhi as a culture-confirmed case.
Results: We identified seven persons with culture-confirmed and two with probable *S.* Typhi infection. All but one were men who reported sex with men; none shared a common food or drink. One asymptomatic man, who had a typhoid-like illness 4 months earlier, shed *S.* Typhi in his stool and had gallstones on ultrasound. Seven of the other eight patients disclosed having sexual contact with this man before becoming ill. Four were HIV-infected. All *S.* Typhi isolates shared an indistinguishable PFGE pattern that differed from all others in the PulseNet database.
Conclusions: This is the first documented outbreak due to sexual transmission of *Salmonella* Typhi. Persons with typhoid fever should refrain from oral-anal and oral-genital contact until culture-negative. Men who have sex with men should be counseled about the risk of sexual transmission of enteric bacterial, viral, and parasitic pathogens.

Key words: sexually transmitted diseases, bacterial; typhoid; homosexuality, male

1:55 *Gwendolyn P. Hammer, T. Aragon, J. Klausner*
Large *Shigella sonnei* Outbreak Among Gay Men — San Francisco, 2000

Background: Shigella dysentary can be severe when it affects immunocompromised persons, including gay men who are HIV infected. Outbreaks among gay men have been caused by *Shigella flexneri;* rarely has *S. sonnei* been implicated. During the summer 2000, an increase in reported cases of *S. sonnei* in San Francisco prompted an investigation.
Methods: We reviewed routine disease reporting forms and laboratory isolates. A case was defined as a laboratory confirmed *S. sonnei* infection from June through October 2000 in a San Francisco County resident aged 15–60 years. In October, shigellosis screening was offered to gay men attending the municipal sexually transmitted disease clinic. We collected demographic data, diarrheal history, and sexual behavior information from persons screened.
Results: From June through October, 168 cases were reported compared to an average of 29 cases in the same time period during 1996–1999. Ninety percent (n=155) of the current cases were male; median age, 38 years (range: 15–60 years); 86% were white; and 95%, gay/bisexual. Five hospitalizations were reported but no deaths. Eighty percent of the case-patients lived in only 20 of 246 census tracts, in predominately gay neighborhoods. Of the first 100 men offered screening, 20% reported having an episode of diarrhea, lasting $\geq$1 day within the previous 30 days. Two people tested positive for *S. sonnei.*
Conclusions: An excess number of cases occurred in San Francisco County among males who were primarily gay/bisexual men and aged >30. The San Francisco Department of Public Health (SFDPH) responded by identifying the population-at-risk, conducting campaigns to increase community awareness, and continuing to offer asymptomatic testing. Because this outbreak persists, SFDPH is further investigating cases to examine specific behaviors and target prevention messages.

Key words: shigellosis, *Shigella sonnei*, sexually transmitted disease, communicable disease

2:15 *Amy J. Khan, A. Wasley, E. Simard, H. Hustad, M. Brooks, R. Lyerla, B. Bell*
Outbreak of Hepatitis B Virus Infection at a Correctional Facility — 2000

Background: Although high-risk behaviors have been reported among inmates, few studies have documented hepatitis B virus (HBV) transmission in correctional facilities (CF). On March 31, 2000, acute hepatitis B was confirmed in a male long-term inmate in a CF. An investigation was conducted to determine the extent of HBV transmission.
Methods: A cohort study was conducted in which inmates occupying the same dormitory (Dorm Y) as the index case-patient were tested for HBV serologic markers and interviewed about exposures during November 15, 1999–May 15, 2000 (incubation period). All other CF inmates were tested for HBV serologic markers, and risk behaviors while incarcerated were ascertained.
Results: Of 97 Dorm Y inmates, 4 (4%) had chronic infection, 16 (16%) were immune, and 6 (6%) had acute infection (attack rate [AR]=6/77 [8%]). Two (33%) acutely infected inmates reported sexual contact with a male inmate during the incubation period (relative risk=11.7, 95% confidence interval=3.4 – 40.5) who was subsequently found to be chronically infected. None reported injecting drug use. No other exposures were associated with acute infection. Five acute infections were identified among 787 susceptible inmates in the remainder of the CF (overall AR=1%). Fourteen (1%) of 1123 CF inmates had chronic infection; none had been previously recognized. During incarceration, 33 (3%) inmates reported injecting drugs, 51 (5%) sex with another male, and 534 (48%) receiving a tattoo.
Conclusions: HBV infection in this CF was associated with sexual transmission, but this exposure accounted for a minority of cases. The high frequency of HBV-associated risk behaviors, unidentified HBV-infected inmates, and many susceptible inmates may have facilitated transmission. Susceptible inmates should be vaccinated against hepatitis B.

Key words: hepatitis B, prison, risk factor, transmission

2:35 *Catherine A. McLean, A. Kaur, P. Kerndt, M. Lawrence, G. Bolan, L. Markowitz, W. Levine, L. Finelli*
Case-Control Study of Risk Factors for Acquiring Infectious Syphilis Among Men Who Have Sex with Men — Los Angeles, 2000

Background: Syphilis, a sexually transmitted disease (STD) manifested by oral, genital, or anal ulcers in its initial stages, can enhance the transmission of human immunodeficiency virus (HIV). Although in the 1990s, syphilis occurred primarily among heterosexual African-Americans in the South, in April 2000, we investigated a large outbreak of infectious syphilis among men who have sex with men (MSM) in Southern California.
Methods: We conducted a case-control study to identify risk factors for acquiring infectious syphilis among MSM in Los Angeles County (LA). Case-patients were MSM with infectious syphilis diagnosed January–April 2000; control-patients were MSM without syphilis. Control-patients were recruited from a gay/lesbian medical clinic and were frequency matched to case-patients by five-year age group. Data were collected through face-to-face interviews.
Results: Twenty-eight case-patients and 56 control-patients participated in the study. The median age of case- and control-patients was 35 and 37 years. Forty-three percent of the case-patients were white and 39% were Hispanic, compared with 57% and 23% of the control-patients respectively. HIV seropositivity was reported by 64% of case-patients and 32% of control-patients (OR, 3.8; 95% confidence interval [CI], 1.5–9.9]. Case-patients were more likely to have attended bathhouses during the interview period (43% versus 14%) (OR, 4.5; 95% CI, 1.6–12.9). Illicit drug use prior to sex was reported by 50% of case-patients and 45% of control-patients.
Conclusions: These data suggest that some MSM are participating in high-risk behavior, placing them at risk for syphilis, other STDs, and HIV. Increased prevention efforts in MSM communities are critical to prevent HIV transmission and to further syphilis elimination.

Key words: syphilis, HIV, men who have sex with men, human immunodeficiency virus, bathhouse, sexually transmitted disease

2:55 ***Sheryl B. Lyss, M. Kamb, T. Peterman, J. Moran, D. Newman, G. Bolan, J. Douglas, F. Rhodes, J. Rogers, J. Zenilman, J. Ehret, C. Gaydos for the Project RESPECT Study Group***

Should We Continue to Co-Treat Gonorrhea Patients for Chlamydia? Co-Infection Rates from Five Sexually Transmitted Disease Clinics — United States, 1993–1996

Background: Sexually transmitted disease (STD) treatment guidelines recommend empiric treatment for chlamydia when persons are treated for gonorrhea. Chlamydia prevalence appears to be declining. We wondered whether co-infection with chlamydia has declined, and whether co-treatment for chlamydia is still appropriate. This is particularly relevant in settings where chlamydia tests are unavailable.
Methods: We used baseline data collected during 1993–1996 in a five-city counseling trial of STD clinic patients. Gonorrhea in women was diagnosed by culture and in men by Gram stain. Chlamydia was diagnosed by polymerase chain reaction. We calculated chlamydia prevalence among persons for whom co-treatment is recommended: (I) gonorrhea-infected men; (II) men with gonorrhea-infected partners; (III) gonorrhea-infected women; and (IV) women with gonorrhea-infected partners.
Results: The analysis included 1904 men and 1871 women. (I) Of 408 gonorrhea-infected men, 74 (18%) had chlamydia. (II) Of 55 men referred by gonorrhea-infected partners, 10 (18%) had chlamydia. Of 802 other men without urethritis, 79 (10%) had chlamydia. In men treated for gonorrhea, chlamydia co-infection was higher among men 25 years (22%) than older men (13%) and differed by city (9%–29%). (III) Of 190 gonorrhea-infected women, 71 (37%) had chlamydia. (IV) Of 153 women referred by gonorrhea-infected partners, 47 (31%) had chlamydia. Of 1615 others, 186 (12%) had chlamydia. In women treated for gonorrhea, chlamydia co-infection was higher among women 25 years (42%) than older women (14%) and differed by city (27%–38%). Prevalence of co-infection was unrelated to site-specific gonorrhea or chlamydia prevalence.
Conclusions: Chlamydia co-infection was common among STD clinic patients treated for gonorrhea, supporting current recommendations for co-treatment. Program directors should recognize that low chlamydia and gonorrhea prevalence do not correlate with low co-infection.

Key words: gonorrhea, chlamydia, prevalence, treatment protocols

3:15 ***Gabriela Paz-Bailey, P. Kilmarx, S. Supawitkul, K. Limpakarnjanarat, N. Young, C. Manopaiboo, P. Mock, S. Korattana, T. Mastro, F. van Griensven***

Risk Factors for Sexually Transmitted Diseases in Adolescents: An Audio-computer Self-interviewing Survey with Noninvasive Specimen Collection — Chiang Rai, Thailand, 1999

Background: Although human inmunodeficiency virus (HIV) infection and sexually transmitted diseases (STDs) have been well studied in some populations in Thailand, little information is available about sexual practices, drug use and STDs in Thai adolescents. Previous studies were limited by participation bias and suspected under reporting of stigmatized behaviors. We used audio-computer-assisted self interviewing (ACASI) and noninvasive specimen collection methods to overcome these biases.

Methods: In 1999, students aged 15 to 21 years attending three vocational schools were invited to participate in a cross-sectional survey. Consenting students completed an ACASI interview. Oral fluid was tested for HIV (EIA and confirmatory Western blot) and urine for *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (NG) by polymerase chain reaction.

Results: Of 1,736 invited students 1,725 (99.4%) agreed to participate. Methamphetamine use was reported by 29%. Among the 835 (48%) participants reporting sexual intercourse, the prevalence of HIV infection was 0.6%, CT 4.9%, and NG 0.4%. Consistent condom use with steady partner was reported by only 5.6%. In a logistic regression analysis, after adjusting for age, factors associated with having an STD (HIV, CT or NG) were: receiving gifts/money for sex (OR=3.4, p=0.01), having had more than four lifetime casual partners (OR=3.0, p=0.04), being female (OR=2.6, p=0.01), and perception of higher HIV infection risk (OR=2.1, p=0.03).

Conclusions: This study shows the acceptability and feasibility of using ACASI and non-invasive specimen collection methods in a developing country. These adolescents had high rates of unprotected intercourse and are at risk for STDs. Prevention programs should emphasize safer sex and limiting the number of sex partners.

Key words: adolescents, STD, risk factor, Thailand

Thursday Morning — April 26, 2001

8:30 Environmental Health. Moderator: Thomas H. Sinks

8:35 ***Marc G. Weisskopf, H. Anderson, L. Hanrahan, M. Kanarek, C. Falk, D. Steenport, L. Draheim, and the Great Lakes Consortium***

Consumption of Polychlorinated Biphenyl-Contaminated Great Lakes Fish is Associated with Low Birth Weight — Great Lakes Region, United States, 1970–1995

Background: Polychlorinated biphenyl (PCBs) exposure leads to low birth weight in several mam-malian species. Effects of chronic environmental exposure in humans are less clear. Consumption of contaminated fish is a principal route of such exposure. Because the consumption of fish has a beneficial effect on birth weight, we examined whether the relation between maternal consumption of contaminated Great Lakes fish and low birth weight has changed since PCBs were banned in 1977.

Methods: Charter boat captains licensed in 1992 or their spouses (presumed frequent fish consumers) and randomly sampled, regionally matched infrequent fish consumers were interviewed by telephone during 1993–1995 about reproductive history for pregnancies since 1970 and fish consumption (n=706). A subset (n=242) donated blood for PCB analysis. Low birth weight (<2500g) was determined from birth certificates. Odds ratios (ORs) and Wald confidence intervals (CIs) were calculated with logistic regression.

Results: During 1970–1977, 8.8% of mothers who ate e100 meals of fish before their child's birth and 4.3% of mothers who ate none had low birth weight children. During 1978–1995, the percentages were 4.2% and 6.7%, respectively. The association between maternal Great Lakes fish consumption and low birth weight was greater (p=.053) for children born during 1970–1977 than for children born later. Median maternal serum PCB

concentration in the captains' group was 2.3 times that of infrequent consumers and positively associated with low birth weight (OR=12.9, 95% CI=1.5–114.3).
Conclusions: These data suggest that chronic environmental PCB exposure leads to low birth weight because the adverse effects of maternal consumption of Great Lakes fish have decreased since PCBs were banned. The adverse association between maternal serum PCB concentration and birth weight supports this conclusion further.

Key words: biological markers, fish products, low birth weight infant, Great Lakes Region, polychlorinated biphenyls

8:55 *Jeffrey B. Nemhauser, R. Kaufmann, G. Noonan, D. Trout, C. Mueller*
Blood Lead Levels Among Children in Yap State — Federated States of Micronesia, April–May 2000

Background: Lead is a neurotoxic hazard for children worldwide. Following a January 2000 nutritional survey on Yap identifying elevated blood lead levels [BLLs] among some children, we performed a study to better characterize pediatric BLLs and identify associated risk factors.
Methods: We collected blood samples from children (1–12 years) at randomly selected schools and municipality sites. Demographic and lead exposure information was obtained from parents by self-administered questionnaires. In a concurrent nested case-control study, parents of cases (BLL≥15 micrograms/deciliter [mcg/dL]) and age-matched controls (BLL<5 mcg/dL) completed interviewer-administered questionnaires; environmental sampling was done at participants' homes.
Results: The geometric mean [GM] of the BLLs for the 424 participants was 4.6 mcg/dL. While the GM BLLs of Native Yapese children and resident non-Micronesians were comparable (4.3 and 4.2 mcg/dL), Outer Island children had significantly higher levels (8.1 mcg/dL, $p \leq 0.05$). Children living in neighborhoods where lead was recycled had significantly higher GM BLLs than those who did not (7.2 mcg/dL vs. 4.6 mcg/dL, $p \leq 0.05$). Children whose families made lead fishing sinkers at home also had higher GM BLLs (5.7 mcg/dL vs. 4.5, $p = 0.06$). Case children's homes were more likely than control homes to have detectable levels of lead in soil (odds ratio [OR] = 7.4, 95% Confidence Interval [CI] = 2.0–27.8) and household dust (OR = 11, CI = 2.1–56.7).
Conclusions: The GM BLL of children surveyed on Yap exceeds that of same-aged US children as measured in National Health and Nutrition Examination Survey III, and Outer Island ethnicity was significantly associated with having an increased BLL. Local environmental contamination due to handling lead is a likely source of elevated BLLs among children surveyed.

Key words: children, environmental exposure, lead/blood, risk factors

9:15 *Dennis Y. Kim, F Staley, J. Curtis*
Relationship Between Housing Age and Childhood Blood Lead Levels in Children — Jefferson County, Kentucky, 1991–2000

Background: Elevated blood lead levels (BLLs) in young children (≤6 years) are associated with lower IQs, impaired neurological development, and behavioral problems. Nearly one million children in the United States have elevated BLLs (≥ 10 µg/dL). Low-income children who live in older houses with dilapidated paint are at greatest risk. The objective was to examine the relationship between housing age and childhood BLLs using geographic information system technology.
Methods: Reported BLLs and addresses for children in Jefferson County, Kentucky from 1991–2000 were obtained by the county health department. Using Centrus desktop software, addresses were geo-coded. Geo-coded addresses were linked to the Property Valuation Administrator's Real Estate Master File (REMF), a tax assessor database from the Louisville and Jefferson County Information Consortium that contains information on the year each house was built, historical data, and assessment values. The relationship among children's BLLs, children's ages and year the houses were built, were analyzed using SAS.

Results: We geo-coded 26,835 children's addresses and obtained housing age from REMF. The mean BLL was 7.6 µg/dL; the median child's age was 39 months, and the median year in which houses were built was 1940. Children living in housing built prior to 1950 had a geometric mean BLL of 9.2 µg/dL, compared with 5.40 µg/dL for children living in houses built in or after 1950 ($p < 0.0001$).
Conclusions: Children living in older houses had higher BLLs than those who did not. GIS can be used to link patients' demographic data to tax assessor data and quantify the risk of elevated BLLs to children by age of housing.

Key words: lead, GIS, housing, children

9:35 *Mark E. Beatty, M. Parrish, R. Genevie, K. Cowen, E. Hoffman, T. Long, F. Smith, S. Olsen*
Restaurant-Associated Outbreak Possibly Linked to Methomyl Poisoning — Ohio, 2000

Background: Sixty percent of foodborne outbreaks reported to CDC have no etiology identified; these outbreaks result in approximately 7000 illnesses each year. In October 2000, an outbreak of unknown etiology among restaurant patrons was identified by the Ohio Department of Health.
Methods: To identify risk factors for illness, we conducted a case-control study, defining a case as nausea or vomiting in a patron of Restaurant A during October 23–27. Controls were well meal companions. Vomitus and food specimens were tested for bacterial and plant toxins and pesticides.
Results: We identified 25 patients and 48 controls. Median age of patients was 46 years (range, 21–79); 64% were female. Twenty-four (86%) patients reported nausea and 16 (57%) vomiting. Median incubation period was 30 minutes (range, 0.2–20 hours); median duration was 2 hours (range, 0.1–48). House salad was the only food significantly associated with illness (odds ratio=8.9; 95% confidence interval=1.1–198). All samples were negative except two of implicated salad that contained 0.18 and 0.05 ppm of methomyl, a widely used agricultural pesticide. These samples were tested 24 days after consumption. Based on the half-life of methomyl, we estimate that a dose of 0.02–0.1 mg/kg of body weight was consumed per salad serving. According to published studies, the maximum safe dose in humans is 0.03 mg/kg. A fly-bait containing methomyl was in use at the restaurant. The precise mechanism by which the salad became contaminated is unknown.
Conclusions: Identifying the cause of outbreaks characterized by rapid onset, short duration gastrointestinal illness is challenging because of the large number of possible agents. Pesticides are widely used in restaurants and should be considered when investigating foodborne outbreaks of this nature.

Key words: foodborne, outbreak, restaurant, methomyl, poisoning

9:55 *R. Charon Gwynn, J. Mott, D. Mannino, S. Redd*
Respiratory and Circulatory Hospital Admissions Associated with Forest Fires — Montana, July–September, 1999 and 2000

Background: Forest fires burned over 948,000 acres in Montana during 2000, peaking between July and August. Particulate matter (PM) concentrations reached a 24-hour average of 300 mg/m^3, exceeding EPA's regulatory standards. While urban PM levels have been associated with increased hospitalizations and mortality, similar effects during forest fires have not been well studied. Identifying populations susceptible to fire smoke is of public health significance as forest fires occur frequently and may produce potentially severe health outcomes.
Methods: We reviewed 2,250 hospital discharge records of patients with cardiac or pulmonary disease (ICD9 codes: 390–519) admitted during July–September 1999 and 2000 in 4 counties with varying smoke exposures: Ravalli (most exposed), Missoula, Lewis & Clark, and Yellowstone (least exposed). Information collected included length of stay, demographics, symptoms, and prior illnesses. We calculated countywide 3-month admission rates by primary diagnosis for 1999 and 2000 using census data for denominators. Rates were compared using a test for differences between population proportions.

Results: We found increases of 91% and 46% ($p<0.05$) in respiratory and circulatory admission rates, respectively, in Ravalli from 1999 to 2000. Specifically, admissions for ischemic heart disease (IHD) increased from 9.5 to 15.9/10,000 ($p<0.05$) and admissions for chronic obstructive pulmonary disease (COPD) increased from 3.1 to 8.1/10,000 ($p<0.05$). For the combined remaining counties, IHD admissions increased slightly from 7.3 to 8.1/10,000 and COPD admissions remained unchanged at 4.7/10,000. IHD admissions increased in all counties, with the greatest increase in Ravalli and the least increase in Yellowstone.
Conclusions: These results suggest that fire smoke can produce severe outcomes in persons with chronic cardiac or pulmonary disease. Interventions targeting these susceptible populations should be considered in future fires.

Key words: forest fire, hospital admissions, circulatory disease, respiratory disease.

10:35 Mackel Award Finalists. Moderator: Stephen M. Ostroff

10:40 ***John A. Crump, A. Sulka, A. Langer, C. Schaben, S. Olsen, R. Gage, E. Chernak, A. Crielly, C. Baysinger, A. Johnston-Entsuah, K. LaVerdure, K. Schmeck, G. Herbert, K. Smith, M. Moll, J. Rankin, R. Berman, G. Withers, S. Reynolds, D. Toney, J. Carroll, S. Hunter, S. Van Duyne, K. Greene, C. Bopp, M. Hoekstra, T. Van Gilder***
Outbreak of *Escherichia coli* O157:H7 Infections Associated with Farm Visits — Pennsylvania, 2000

Background: *Escherichia coli* O157:H7 (O157) causes an estimated 60 deaths and 73,000 illnesses annually in the United States. Most reported outbreaks are from contaminated from food or water. Direct transmission of O157 from animals to humans has recently been recognized. A large outbreak associated with a petting farm was the first to include extensive investigation of O157 transmission on a U.S. petting farm.
Methods: We conducted a household survey and case-control study among farm attendees, focusing on animal exposure, foods, and handwashing practices. Probable case-patients developed diarrhea within 10 days of visiting the farm; confirmed case-patients also had O157 isolated from stool or developed hemolytic-uremic syndrome (HUS). Patients were identified by enhanced surveillance; controls were sought by sequential digit dialing and frequency matched by age group. Patient stool samples, rectal or cloacal swabs of the herd (including cattle, sheep, goats, llamas, chickens, pigs, ponies), water, trough-biofilm, and surface samples were collected for O157 culture. Isolates underwent pulsed-field gel electrophoresis (PFGE) subtyping.
Results: We identified 51 patients; 16 were hospitalized and 8 developed HUS. The median age of patients was 4 years (range 1 to 52 years). Onset dates were from September 4 through November 8. Univariate analysis showed that patients were significantly more likely than controls to have had physical contact with cattle (summary OR 10.94, 95% CI=1.69–70.68). Activities that promoted hand-mouth contact (eating, nail biting) were significantly associated with illness. Handwashing before eating was protective (summary OR 0.23, 95% CI=0.08–0.74). No specific food item was associated with illness. O157 isolates from humans, 13% (27/216) of cattle, and a handrailing all had the same PFGE pattern. O157 of other PFGE patterns was isolated from 2% (5/216) of cattle and 1 animal trough biofilm sample. The household survey estimated that 7,000 people developed diarrhea associated with the farm.
Conclusions: In this large outbreak, O157 was transmitted via direct contact between animals and children. We conducted the first extensive U.S. study of farm ecology of O157 in the setting of an outbreak due to animal-human transmission. Cattle contact and hand-mouth activities were specifically associated with illness. Handwashing was protective. The findings are being used to develop prevention strategies for such venues.

Key words: *Escherichia coli* O157, farm animals, handwashing, zoonoses

11:00 ***Dejana Selenic, F. Alvarado-Ramy, M. Arduino, S. Holt, F. Cardinali, B. Blount, F. Smith, M. Pearson, J. Tokars, Hemodialysis Toxic Reaction Working Group***
Illness and Death in Hemodialysis Patients Due to Parenteral Exposure to Sulfur-containing Compounds — Ohio, 2000

Background: Each year approximately 250,000 U. S. patients receive hemodialysis for renal failure. On August 30, 2000, several patients at dialysis Center A became acutely ill during dialysis; dialysis was stopped and the center closed.
Methods: We conducted a cohort study of all 44 patients who received dialysis at Center A, on August 30, 2000. A case-patient was defined as a patient who developed chills within 5 hours after starting hemodialysis. We reviewed dialysis procedures and collected water samples for microbiologic and chemical assays.
Results: Sixteen patients met the case definition. All were hospitalized; two died. Besides chills, 15 (94%) case-patients experienced nausea; 12 (75%), vomiting; and 4 (25%), fever. Illness was more frequent on the second than first dialysis shift (16/20 vs. 0/24, $p<0.001$); no other factors were significant. The water treatment system had not received adequate maintenance and disinfection and an unpleasant sulfur odor was noted during sampling of the reverse osmosis (RO) unit. Water from the RO unit had elevated bacterial counts and volatile sulfur-containing compounds (i.e., methanethiol, carbon disulfide, dimethyldisulfide, and sulfur dioxide) were detected by gas chromatography/mass spectrometry in 8/11 water samples from the RO unit and in 0/28 samples from other areas ($p<0.001$). Tests for heavy metals and chloramines were within normal limits.
Conclusions: Our results suggest that parenteral exposure to sulfur–containing compounds could have caused the outbreak; bacteria present on the RO unit likely produced these compounds. Inhalation of sulfur-containing compounds is known to produce similar symptoms; we are not aware of previous reports of parenteral exposure to sulfur-containing compounds. This investigation demonstrates the importance of appropriate disinfection and maintenance of water-treatment systems in hemodialysis centers.

Key words: hemodialysis, disease outbreaks, toxicology, sulfur compounds, water treatment

11:20 ***Kevin L. Winthrop, M. Abrams, I. Schwartz, D. Gillies, M. Yakrus, D. Vugia***
When Beauty Is More Than Skin Deep: An Outbreak of Rapidly Growing Mycobacterial Furunculosis Associated with a Nail Salon — California, 2000

Background: Rapidly growing mycobacteria (RGM), while environmentally ubiquitous, are not known to cause outbreaks in the community setting; and infectious disease outbreaks have not been documented in the large and growing American nail care industry. We investigated a large outbreak of persistent lower extremity RGM furunculosis among pedicure customers of nail salon A.
Methods: Probable cases were defined as persistent boils below the knee in salon A customers, and were identified through physician and patient reporting. A case-control study was conducted with the first 48 probable cases contacted; 56 unaffected friends and family with salon A pedicure exposure served as controls. Environmental cultures were obtained from salon A. RGM isolates were subtyped with multilocus enzyme electrophoresis (MEE).
Results: To date, 109 probable cases of RGM furunculosis have been identified; 24 had RGM isolated (7/7 speciated as *Mycobacterium fortuitum*). Patients were females aged 10 to 65 years, and most had multiple boils (median=2, range 1-37). All cases and controls had whirlpool footbath exposure. Leg shaving with a razor prior to pedicure (73% cases versus 32% controls; odds ratio [OR]=5.7; 95% confidence interval [CI]=2.3-14.2) and oil massage during the procedure (78% cases versus 55% controls; OR=2.9; 95% CI=1.2-7.4) were risk factors for RGM infection. When stratified, only leg shaving remained a significant risk factor. Cultures of all salon A footbaths yielded RGM. MEE matched one footbath *M. fortuitum* isolate with 2 patient isolates.
Conclusions: This is the first reported community outbreak of RGM, and the first associated with nail salon whirlpool footbaths. It highlights the potential risk of RGM infections in the community setting, and the need for strict disinfection guidelines for these machines.

Key words: mycobacteria, atypical, disease outbreak, furunculosis, skin diseases, infectious, mycobacteria fortuitum, whirlpool

11:40 ***Marion A. Kainer, A. Sohn, A. Cruz, S. McAllister, S. Holt, M. Kellum, M. Pearson, and the Community Acquired MRSA Study Group***

Bath Towels, Body Shaving and Turfburns: An Outbreak of Methicillin Resistant *Staphylococcus aureus* in a College Football Team — Pennsylvania, 2000

Background: Methicillin resistant *Staphylococcus aureus* (MRSA) accounts for >40% of all staphylococcal infections acquired within hospitals. Community acquired MRSA (CA-MRSA) is an emerging problem; however risk factors for acquisition and transmission of MRSA outside healthcare facilities are poorly understood. Over a four-week period, 10 members of a college (College A) football team developed MRSA skin and soft tissue infections; seven (70%) were hospitalized.
Methods: A case was defined as MRSA infection in a College A student from September 12 through October 30, 2000. To assess exposures associated with MRSA infection, we conducted a retrospective cohort study of the 74 team members. We performed nasal cultures on players and their roommates, trainers, and coaches to assess MRSA carriage. All MRSA isolates were typed using pulsed field gel electrophoresis (PFGE).
Results: Ten cases were identified; all were confined to the football team. Abscesses were located on the arms (6), chest/trunk (3), legs (1) or pilonidal area (1). Exposures associated with cases were turfburns sustained on artificial turf (9/29 vs 1/45, Relative Risk [RR] 14.0, 95% Confidence Interval [CI] 1.9–104.5, p<0.001); shaving the body (6/19 vs 4/55, RR 4.3, CI 1.4–13.8, p=0.02) and sharing bath towels in the locker room (7/25 vs 3/49, RR 4.6, CI 1.3–16.2, p=0.03) or the dormitory (4/5 vs 6/69, RR 9.2, CI 3.8–22.2, p<0.001). Of 178 persons cultured, only one MRSA nasal carrier (a known case) was identified. All MRSA isolates were genetically identical.
Conclusions: CA-MRSA may be associated with substantial morbidity in previously healthy persons. These findings suggest that turfburns and shaving sites provide 'portals of entry' for MRSA and that MRSA transmission in non-healthcare settings may result from sharing bath towels.

Key words: *Staphylococcus aureus*, Methicillin resistance, cross infection, community-acquired infections, disease outbreak

Wednesday–Thursday Poster Session

12:30 Poster Session No. 2 — Meet the Authors

(see Wednesday schedule for list of presentations)

Thursday Afternoon — April 26, 2001

1:45 Primum Non Nocere: Assessing the Safety of Interventions.
Moderator: Susan Y. Chu

1:50 ***Thomas M. Verstraeten, F. DeStefano, L. Jackson, P. Benson, C. Okoro, S. Black, H. Shinefield, J. Mullooly, R. Chen, and the Vaccine Safety Datalink Team***

Risk of Demyelinating Disease after Hepatitis B Vaccination — West Coast, United States, 1995–1999

Background: Concerns that hepatitis B vaccination may cause or precipitate demyelinating diseases such as multiple sclerosis and optic neuritis, have substantially disrupted hepatitis B vaccination programs in France and elsewhere. A case-control study was conducted to assess this association among members of three large managed care organizations (MCOs), located on the West Coast of the US.
Methods: Cases were identified through a search of automated clinic records for diagnoses of demyelinating disease, occurring after 1995, and subsequently confirmed by medical record review. One to three controls were matched to confirmed cases by date of birth (within one year), gender, MCO membership and years of cumulative enrollment time. The first date of demyelinating symptoms recorded in the charts served as the index date. History of hepatitis B vaccination was determined by chart review and telephone interview. Conditional logistic regression models were used to estimate the risk of demyelinating disease associated with vaccination prior to the index date, adjusting for race and ethnic origin.
Results: Among 422 cases and 921 matched controls, 62 (15.6%) cases and 123 (14.5%) controls had received hepatitis B vaccine prior to the index date. The odds ratio for ever being vaccinated against hepatitis B prior to symptom onset was 1.09 (95% CI: 0.70 – 1.70).
Conclusions: Hepatitis B vaccination was not associated with demyelinating disease in the study population. Future analyses will compare the risk of demyelinating disease in specific risk intervals following hepatitis B vaccination, to differentiate between causal and triggering effects. Current findings, however, suggest that the vaccine plays no etiological role in the development of MS and other demyelinating diseases and vaccination efforts should therefore be resumed.

Key words: hepatitis B vaccine, demyelinating diseases, multiple sclerosis, case control study

2:10 ***Alicia M. Fry, H. Jha, J. Chaudary, J. Elliott, T. Lietman, T. Hyde, R. Pokhrel, I. Chuang, A. Schuchat, S. Dowell***

Secondary Effects of Mass Chemoprophylaxis with Azithromycin to Eliminate Blindness Due to Trachoma — Nepal, 2000

Background: A global elimination campaign for blinding trachoma includes treatment of entire villages with azithromycin. One study found azithromycin resistance in common pathogens increased after a single dose, increasing costs and compromising treatment. Mass antibiotic prophylaxis may decrease infections other than trachoma.
Methods: We randomly enrolled children ≤10 years of age from six Nepalese villages: in three villages (group 1), children received initial azithromycin on day 0, and in three other villages (group 2), children had received azithromycin 6 months earlier. We collected nasopharyngeal swabs, inspected for impetigo, and obtained information regarding symptoms at days 0, 10, and 180. Pneumococci isolated from nasopharyngeal swabs were tested for antibiotic susceptibility. We compared resistance, impetigo, respiratory symptoms, and diarrhea among children from the two groups at each time point. We compared resistance in children from groups 1 and 2 at baseline with a third group from two villages that received two previous azithromycin doses, six and 18 months earlier, adjusting for clustering.
Results: Azithromycin reduced fever (RR=0.53, 95% CI: 0.28,0.99), diarrhea (RR= 0.42, 95% CI: 0.27,0.79), and impetigo (RR=0.42, 95% CI: 0.21,0.81) 10 days after treatment. No azithromycin-resistant pneumococci

occurred in any samples from the 345 children in groups 1 and 2 at any time point, while azithromycin-resistance occurred significantly more in group 3 (day 0: 2/115 [1.7%], day 180: 4/108 [3.7%])(p values < 0.05 vs. groups 1 and 2).
Conclusions: The absence of macrolide-resistant pneumococci after one mass treatment with azithromycin in Nepal is encouraging in light of previous studies. We found beneficial effects beyond trachoma control. Azithromycin-resistance in group 3 may indicate the need for resistance monitoring when multiple rounds of antibiotic are given.

Key words: antibiotics macrolides, Streptococcus pneumoniae, trachoma, Nepal

2:30 ***Young J. Hur, K. Kohl, P. Rhodes, R. Davis, R. Chen and the Vaccine Safety Datalink Team***
Risk of Seizures Following Acellular Pertussis Vaccine — United States, 1992–1999: Results from the Vaccine Safety Datalink

Background: Concerns about the safety of whole cell pertussis (wP) vaccine led to the development and licensure of acellular pertussis (aP) vaccines. Pre-licensure aP trials suggested a lower rate of severe adverse events like seizures; however, these studies had limited sample size and duration of follow-up. While post-marketing surveillance through the passive Vaccine Adverse Event Reporting System has revealed no new safety concerns with aP to date, active follow-up in larger populations is needed for scientifically rigorous risk evaluation. The Vaccine Safety Datalink (VSD) was created by CDC in collaboration with several health maintenance organizations (HMO) to meet this need.
Methods: We analyzed computerized vaccination, hospitalization, and emergency room data from 1992–1999 for a cohort of 903,000 children $\leq$2 years enrolled in three VSD HMOs. By 1997, all HMOs had begun using aP in the first year of life. We calculated relative risks (RR) for first recorded seizure events identified by ICD-9 code on days 0, 1 and 2–14 following vaccination compared with risks for seizures in other time periods.
Results: The risk for seizures was not elevated following aP on the day of vaccination (RR=0.85; 95% confidence interval [CI]= 0.37–1.91), the day after vaccination (RR=0.76; CI=0.33–1.71) or 2–14 days after vaccination (RR=0.95; CI=0.76–1.18). In contrast wP was associated with an increased risk of seizures on the day of vaccination (RR=2.27; CI=1.48–3.48) and the day after vaccination (RR=2.58; CI=1.73–3.85).
Conclusions: We confirm the increased safety of aP over wP vaccine for seizures. Further rigorous studies will be needed to examine whether aP also causes fewer rare serious adverse events like acute encephalopathy.

Key words: vaccines, seizures, acellular pertussis, adverse events

2:50 ***Brad S. Winterton, D. Reissman, W. Daley, D. Batts-Osborne, C. Rubin***
Allergic Reactions to Genetically Modified Corn in the Human Food Supply — United States, 2000

Background: Increasing use of genetically modified foods poses undefined potential hazards to public health. The September 2000 detection of Cry9C — StarLink™ corn's genetically engineered pesticide protein licensed in 1998 for animal and commercial use — in taco shells led to highly publicized recalls, concerns about widespread contamination, and multiple adverse health event reports. In October 2000, the Food and Drug Administration asked CDC to investigate this first known, inadvertent release of an unapproved, bioengineered product into human foods. Our objective was to rapidly determine if the adverse health events represented allergic reactions to Cry9C.
Methods: We defined a possible case as an adverse health event reported during July 1 through November 30, 2000, linking corn product consumption to 1) anaphylactic symptoms within one hour after eating, 2) dermatologic symptoms within 12 hours after eating, or 3) gastrointestinal symptoms within 12 hours after eating. We administered a questionnaire to characterize exposures and symptoms, obtained medical records to verify diagnoses, and collected serum samples for future testing.
Results: Twenty-eight (56%) of 50 adverse health events met our case definition. Of 18 (64%) persons interviewed, 12 (67%) reported anaphylactic symptoms, 14 (78%) reported dermatologic symptoms, and nine

(50%) reported gastrointestinal symptoms. Thirteen (72%) sought medical care and 14 (78%) were self- or physician-treated for allergic reaction. Ten (56%) serum samples were banked.
Conclusions: The clinical picture from the 18 interviews is compatible with food allergic reaction. These preliminary results contributed to multi-agency efforts to keep StarLink™ out of human foods pending development of a Cry9C-specific IgE serum assay to more definitively determine the link, if any, between adverse health events and consumption of food products containing Cry9C.

Key words: biotechnology, food allergy, insecticides, *Bacillus thurigiensis*, crystal protein

3:35 Vector-Borne Diseases. Moderator: James L. Hadler

3:40 *Timothy H. Holtz, L. Marum, C. Mkandala, N. Chizani, J. Roberts, A. Macheso, M. Parise, S. Kachur*

Health-Care Seeking Behavior and Home Treatment for Febrile Illness — Blantyre District, Malawi, 2000

Background: Malaria is a leading cause of death in children in Malawi. As part of the WHO's Roll Back Malaria initiative, African heads of state have pledged that by 2005, 60% of children will receive an effective antimalarial drug within 24 hours of developing fever. We studied care-seeking behavior and home treatment in Blantyre District to provide the first population-based baseline estimate of this important international standard.
Methods: We performed a systematic cluster sample survey of 1080 households in 36 census enumeration areas in Malawi's Blantyre District in February 2000. Our sample included 672 households with children under 5 years old.
Results: Among 912 children under 5 years old, caretakers of 413 (45.3%) reported that their child had had a fever within the past 14 days. Of the 303 (73.4%) caretakers who administered medication during their child's febrile illness, 56 (18.3%) gave an antimalarial drug at home. Half (211, 50.6%) of the caretakers took their child to a health facility. Nearly half (167, 40.8%) of recently febrile children neither received an effective antimalarial at home nor were seen in a health facility. Only 21 (5.1%) received an effective antimalarial drug within 24 hours. Caretakers with formal primary school education were more likely to have given their children an antimalarial drug promptly (RR=2.44, p=0.01) or at all (RR=1.73, p=0.02).
Conclusions: A substantial number of children in Blantyre District did not receive antimalarial therapy at all during recent febrile illnesses. Prompt home treatment with effective antimalarial drugs was particularly uncommon. A substantial effort to improve home management and health facility utilization will be necessary to be able to achieve Roll Back Malaria goals before 2005.

Key words: malaria, home treatment, health facilities, antimalarial drug

4:00 *John M. Hayes, E. García-Rivera, G. Suárez, R. Flores, T. Mata, R. Coto, R. Reyna, R. Baltrons, E. Mendoza, J. Rigau-Pérez*

Risk Factors for Infection During a Severe Dengue Outbreak — El Salvador, 2000

Background: In June 2000, the Ministry of Health of El Salvador identified a dengue 2 virus epidemic in San Salvador involving the Jamaica genotype. By mid-August, it reported 1,098 laboratory-positive cases and 9 deaths (all < 9 years old), and issued a nationwide health alert. CDC helped define the risk factors for infection.
Methods: A simple random sample of 107 households was surveyed in an affected 400-household community and information was collected on knowledge, attitudes, and practices about dengue and its mosquito vector. In blood samples obtained from respondents, recent infection was documented by detection of IgM or high-titer IgG anti-dengue antibodies, and previous infection was detected by presence of IgG.
Results: We conducted interviews in 106 of 107 households, and obtained information on 501 residents and blood samples from 380 (75.8%) persons. Recent infection was documented in 31 persons (8.2%, 95%

confidence interval [CI]=5.7–11.5)(median age 12 years) and 24 (22.6%, 95% CI=15.1–31.8) of 106 homes. Previous infection was detected in 355 (93.4%, 95% CI=90.3–95.6) of 380 persons. Persons with recent infection were more likely to live in houses with water stored in concrete tanks (9.9% vs. 2.9%, Odds Ratio = 3.7, 95% CI=1.2–15.8). Although 90 (84.9%) of 106 informants said mosquitoes transmitted dengue, only 21 (23.3%) of 90 reported actions against larval habitats. Containers with larvae were found in 39 homes (36.8%, 95% CI=27.6–46.7).

Conclusions: Although respondents associated dengue with mosquitoes, few took control actions. Study results caused the Ministry to improve community education efforts towards eliminating the mosquito's aquatic stage. Three contributors to lethality in dengue epidemics were documented: high incidence of infection, known virulent genotype, and a population with prior dengue infection.

Key words: dengue, dengue hemorrhagic fever, risk factors

4:20 *Sarah L. Lathrop, R. Ball, P. Haber, G. Mootrey, M. Braun, S. Shadomy, R. Chen, E. Hayes*
Adverse Event Reports Following Vaccination for Lyme Disease — United States, 1998–2000

Background: In December 1998 the Food and Drug Administration (FDA) licensed the first vaccine to prevent Lyme disease, a recombinant protein vaccine. Due to public concern about immune-mediated consequences of the Lyme disease vaccine, we examined adverse event reports associated with its use.

Methods: The Vaccine Adverse Event Reporting System (VAERS) monitors vaccine safety post-licensure. We analyzed all VAERS reports associated with Lyme disease vaccine from its licensure in December 1998 through July 2000. Special attention was paid to serious events and events that may be immune-mediated, including arthritis and facial paralysis.

Results: VAERS received 891 reports of Lyme vaccine-associated adverse events (0.06% of a total of 1.4 million doses distributed). The most commonly reported events were arthralgia (250 reports) and myalgia (195 reports). Sixty-six events were classified as serious, including 35 hospitalizations, 14 life-threatening illnesses, 21 disabilities, and 4 deaths. There were 59 reports of arthritis, but fewer than 25% noted joint tenderness, limited motion, warmth, swelling, or effusion, and only eight were classified as serious. There were 14 reports of facial paralysis, with two classified as serious.

Conclusions: Although VAERS data do not allow determination of causal relationships between vaccines and adverse events, reported adverse events following Lyme disease vaccination were uncommon, and similar to adverse events reported from the Phase III randomized clinical trial of the vaccine. Follow-up surveys of serious events and facial paralysis reports, as well as a case-control study of patients with arthritis, are underway to determine possible causal associations.

Key words: Lyme disease, vaccination, arthritis, facial paralysis

4:40 *Denis Nash, A. Labowitz, B. Maldin, B. Wallace, D. Martin, J. Roehrig, G. Campbell, M. Layton*
A Follow-Up Study of New York City Residents Infected During a 1999 Outbreak of West Nile Viral Disease

Background: Relatively little is known about the long-term prognosis for patients hospitalized with West Nile (WN) viral infection, a mosquito-borne illness. In the summer of 1999, an outbreak of WN meningoencephalitis occurred in New York City (NYC), resulting in 45 clinical cases and four deaths among previously healthy persons. A follow-up study was conducted to longitudinally characterize the antibody response among surviving NYC residents (n=42) and to describe their recovery.

Methods: Patients were contacted by telephone 6 months after onset and asked to participate in interviews and a phlebotomy visit. Trained interviewers with standardized questionnaires ascertained discharge disposition, subjective symptoms, cognitive disposition, and functional status. Blood specimens were tested for the presence of IgM and IgG antibodies.

Results: Of the 42 surviving NYC residents, 38 (90%) participated in the 6-month interview, 22 of whom (58%) provided a blood specimen. Only 45% of persons aged $\geq$65 years (n=9) were discharged to home, compared with 87% of persons aged <65 years (n=13). The remainder of persons aged $\geq$65 years (n=11) were

discharged to a rehabilitation facility (25%), nursing home (20%), or relative's home (10%). At 6 months, 75% (n=27) reported difficulty walking post-discharge. The most prevalent self-reported symptoms at 6 months were muscle weakness (64%), malaise (63%), memory loss (56%), stiff neck (44%), confusion (44%), and insomnia (44%). At 6 months post-onset, 55% of those providing a blood specimen still had detectable levels of IgM antibodies (i.e., positive titers), and 96% had IgG antibodies.
Conclusions: At 6 months post-onset, many patients continue to experience persistent symptoms that may be attributable to their WN infection. The persistence of IgM antibodies at 6 months post-onset complicates interpretation of data from ongoing public health surveillance for WN.

Key words: West Nile virus, follow-up study, serology, antibodies, symptoms

Friday Morning — April 27, 2001

8:30 Violence and Health. Moderator: Melvin A. Kohn

8:35 *Peter Salama, P. Spiegel, C. Gotway*
Mental Health Outcomes Among Expatriate Relief Workers — Kosovo, June, 2000

Background: Psychological morbidity may represent a critical occupational health hazard for the increasing number of expatriate relief workers assisting in countries affected by war and civil strife. The mental health consequences of exposure to traumatic events and the risk factors for psychological morbidity among this group have not been previously studied.
Methods: In June 2000, we surveyed all 410 expatriate relief workers from 22 humanitarian organizations implementing health programs in Kosovo. Of these, 285 (69.5%) completed the demographic questionnaire and two psychological screening tools. We used logistic regression to generate adjusted odds ratios (AORs); models included other risk factors for depression such as age, sex, education, employment, marital status, psychiatric history and number of missions.
Results: Of the respondents, 68 (23.9%) had experienced sniper fire; 100 (35.1%), verbal or physical threats; and 32 (11.2%), prolonged separation from their immediate families. Although only 1.1% of relief workers reported symptoms of post-traumatic stress disorder, 17.2% reported depressive symptoms. Relief workers who had completed five or more missions were more likely to have experienced depressive symptoms than were those on their first mission (AOR=5.1, 95% confidence interval [CI]:1.4–18.3). Relief workers who had experienced four or more trauma events were more likely to have experienced depressive symptoms than were those who reported none (AOR=5.3, 95% CI:1.5–19.0). The likelihood of depressive symptoms was high for those reporting poor organizational support services (AOR=10.8, 95% CI: 2.0–58.8) and for those who had experienced family separation (AOR=5.0, 95% CI:1.4–10.0).
Conclusions: Expatriate relief workers in Kosovo, particularly those deployed frequently, have high rates of depressive symptoms. Organizational support services may be an important mediating factor and should be targeted towards this group.

Key words: relief workers, mental health, support services

8:55 ***Lauren S. Barnes, R. Ikeda, M. Kresnow***

Help-Seeking Behavior Prior to Nearly Lethal Suicide Attempts: A Case-Control Study of Attempted Suicide — Houston, Texas, 1992–1995

Background: Suicide is the third leading cause of death among adolescents and young adults. Prevention efforts focus on recognition of those at risk and intervention by professionals, yet little data on help-seeking prior to suicidal behavior exists.

Methods: We conducted a population-based case-control study of attempted suicide among persons aged 15–34 in Houston, Texas from 1992–1995. We interviewed 153 case-patients who made a nearly lethal attempt and were treated at an emergency department, and 513 control-subjects identified through random digit dialing. Respondents were asked whether and from whom they sought help for health/emotional problems in the month prior to attempt, and whether suicide was discussed. Multivariable analyses were conducted to control for age, sex, hopelessness, depression, marital status, previous attempt and medical illness.

Results: The majority of case-patients sought help from someone (63%) prior to the attempt (primarily family/friends, 49%). However, after controlling for confounders, case-patients were less likely than controls to seek help from professionals (Odds Ratio=0.5, 95% Confidence Interval=0.3–0.9) or anyone (OR=0.5, 95%CI=0.3–0.8). Among those who did seek help, case-patients were more likely to discuss suicide (OR=2.6, 95%CI=1.2–5.4) particularly with a professional (OR=11.8, 95%CI=3.2–43.2).

Conclusions: These findings suggest that young persons are less likely than nonsuicidal controls to seek help prior to a nearly lethal suicide attempt. Family/friends are more frequently contacted than other sources, but the subject of suicide is more likely to be discussed with professionals. It is important to encourage help-seeking, improve community awareness of suicide to better enable family/friends in providing help, and to promote effective intervention for those who discuss suicide with professionals.

Key words: suicide, suicide attempt, help seeking, contacts, case-control

9:15 ***Krista R. Biernath, S. Keller, M. Anderson, L. Paulozzi, T. Simon, M. Kresnow, M. Fierro***

Female Intimate Partner Homicide-Suicide Events — Virginia, 1990–1999

Background: In 1998, nearly 1,500 females were killed by an intimate partner (current/former spouse, dating partner, same-sex partner) in the United States. An estimated 25% of these deaths were followed by the suicide of the perpetrator. In Virginia, the Office of the Chief Medical Examiner suspected an increase in intimate partner homicide-suicide (IPHS) events, despite a statewide decrease in the rate of female homicides.

Methods: We identified all female homicides and abstracted all female IPHS events in Virginia, 1990–1999, through medical examiner chart review. A female IPHS event was defined as an event where an individual killed a female intimate partner (≥12 years of age and a resident of Virginia) and committed suicide within one week. For comparison, we calculated rates of all homicides for females ≥12 years in Virginia using vital statistics.

Results: Preliminary data showed that from 1990–1999, 189 female IPHS events occurred in Virginia. Victims were primarily white (60.4%) and older than 25 years (75%). Firearms were involved in 98% of the IPHS events. The rate of female IPHS was significantly higher (50% higher; p=.03) during 1998–99 relative to the average rate for the previous eight years; overall female homicide rates decreased 36% during this period. Compared to all female homicides, firearms were used more often in female IPHS events (OR=9.5, 95%CI=5.2–17.6).

Conclusions: Results of this study highlight increasing female IPHS rates in Virginia and the links between fatal intimate partner violence, suicide, and firearms. We need to replicate this process in other states to determine whether a similar pattern may exist. In addition, this information could be used to develop a surveillance tool for female IPHS events nationwide.

Key words: homicide, suicide, domestic violence, women

9:35 ***Louisa J. Castrodale, M. Beller***
Firearm-Related Injuries in Alaska, 1996–1998

Background: Previous research demonstrated that Alaskans aged 0–19 years had the third highest firearm-related fatality rate in the nation, and that within the state, Alaska Natives experienced higher rates than non-Natives. Such fatalities have been the leading external cause of death in Alaska since 1997, representing a substantial and ongoing public health challenge. A 1996 state regulation mandated reporting of firearm-related injuries. This study analyzed data from that reporting system for the first time.
Methods: Firearm-related injuries were defined as fatal or nonfatal penetrating wounds from weapons using gunpowder to fire projectiles. Data came from vital statistics reports, a statewide trauma registry, health-care providers, state troopers, and newspapers.
Results: During 1996–1998, the reported annual rate of firearm-related injuries was 30/100,000. The nonfatal to fatal ratio in Alaska was 1.4:1, compared to a U.S. ratio of 2.0:1. Completeness of reporting was not assessed. Persons injured were disproportionately male (84%), aged 15–24 years (35%), and Alaska Native (27%). Intent (with comparable U.S. proportions) was assault/legal intervention in 39% (63%), self-inflicted in 29% (22%), unintentional in 25% (15%) and undetermined in 7% (0%). Alaska Natives had annual self-inflicted and unintentional injury rates of 22 and 10/100,000, respectively; rates for non-Natives were 4 and 3/100,000, respectively.
Conclusions: Firearm-related injuries resulted in death more often in Alaska than in the entire nation, with self-inflicted and unintentional injuries constituting greater proportions of injuries. Alaska Natives (16% of the population) experienced 27% of injuries, with higher rates of self-inflicted and unintentional injuries than non-Natives. This study establishes current firearm-related injury statistics for Alaska, indicating that prevention programs should focus on factors contributing to self-inflicted and unintentional injuries, particularly among Alaska Natives.

Key words: Alaska, firearms, gunshot wounds, population surveillance, suicide

Friday Afternoon — April 27, 2001

1:30 HIV/AIDS. Moderator: James W. Buehler

1:35 ***Shannon Hader, T. Hodge, K. Buchacz, R. Bray, N. Padian, A. Rausa, S. Slavinski, S. Holmberg***
Class II Human Leukocyte Antigen (HLA) DRB3 Discordance is Associated with Human Immunodeficiency Virus (HIV) Discordance in Heterosexual Couples; United States, 2000

Background: Identification of immunologic factors that protect against HIV transmission may contribute to the design of effective HIV vaccines. Human leukocyte antigens (HLAs) are integrated into the HIV envelope as HIV buds from host CD4+ cells; these integrated HLAs could theoretically determine whether HIV is "rejected" by an exposed susceptible person (preventing transmission), much like tissue transplants are accepted or rejected based on HLA matching between donor and recipient.
Objective: To determine if HLA discordance (mismatching) is more frequent within partner-pairs in which HIV transmission has not occurred (HIV discordant couples) compared to those in which HIV transmission has occurred.
Methods: Partner-pairs in which at least one partner was HIV-infected and heterosexual exposure or transmission between partners had occurred were identified from two epidemiologic studies — a Mississippi HIV cluster investigation and a California partner-pairs study. Class I (A, B, C) and Class II (DRB1, DRB3, DRB4, DRB5, DQB1) HLA-typing was performed on stored blood samples.
Results: 10 (29%) of 34 partner-pairs in which HIV transmission did not occur were immunologically discordant at HLA DRB3 antigen, with DRB3 present in the HIV-infected partner and absent in the susceptible partner, compared with 0 (0%) of 13 partner-pairs in which HIV transmission did occur (odds ratio, undefined; Fisher Exact p=0.025). Differences in concordance at other HLA loci were not observed.

Conclusions: Heterosexual partner-pairs in which HIV transmission did not occur were more frequently HLA-discordant at the Class II DRB3 antigen, indicating a possible partial protective effect of HLA mismatching at DRB3. Further investigation of the roles of Class II HLAs in preventing HIV transmission and as possible components of HIV vaccines should be pursued.

Key words: HIV, HLA antigens, HIV vaccine development

1:55 *Robert D. Newman, A.van Eijk, B. Nahlen, J. Ayisi, M. Kolczak, C. Yang, Y-P. Shi, F. ter Kuile, J. Otieno, A. Lal, R. Lal, R. Steketee*

Maternal Malaria Infection and Perinatal Transmission of Human Immunodeficiency Virus in a Malarious Area — Western Kenya, 1996–2000

Background: *Plasmodium falciparum* malaria infects up to 70% of African primigravidae. Human Immunodeficiency Virus (HIV) infects 5%–40% of pregnant women; 13%–40% transmit HIV to their infants. We investigated whether maternal placental malaria (PM) is associated with an increased risk of perinatal transmission (PT) of HIV.

Methods: We conducted a prospective cohort study among HIV-seropositive women delivering in Kisumu, Kenya. Participants were interviewed and their delivery information recorded; HIV viral load (VL) was measured 1-month postpartum. Newborns were monitored monthly for 6–12 months with polymerase chain reaction tests for HIV. We considered infants with two consecutive positive tests (with one ≤4 months of age) to have acquired HIV perinatally.

Results: Between June 1996 and May 2000, 500 mother-infant pairs were enrolled for whom PM and infant HIV status are known; 100 (20.0%) infants acquired HIV, and 124 (24.8%) women had PM. In univariate analysis, factors associated with PT included low birth weight (LBW) (risk ratio [RR]=1.81, 95% confidence interval [CI]=1.08–3.02), episiotomy/perineal tear (RR=1.59, 95% CI=1.12–2.26), gravidity ≤ two (RR=1.62, 95% CI=1.08–2.44), and log VL ≥ 7.65 (RR=2.98, 95% CI=1.80–4.94), but not prematurity, prolonged rupture of membranes, CD4 count < 500, or PM. In multivariate Poisson regression, log VL (Adjusted RR [ARR]=1.77, 95% CI=1.40–2.25) and LBW (ARR=2.02, 95% CI=1.00–4.09) were associated with PT. Among women with PM, PT rates were greater in those with parasite density median (19.1% vs. 8.2%); however, in multivariate analysis, only VL was associated with PT.

Conclusions: Maternal HIV viral load, LBW, and perineal trauma at delivery were associated with PT. Placental malaria does not appear to be associated with increased perinatal HIV transmission in this setting.

Key words: malaria; HIV; pregnancy; disease transmission, vertical; placenta; risk factors

2:15 *Monica L. Nolan, D. Thewanda, S. Kanshana, A. Teerararatkul, T. Naiwatanakul, N. Skunodom, R. Simonds*

Evaluation of a Pilot Program to Prevent Mother-to-Child Human Immunodeficiency Virus Transmission — Northeastern Thailand, 1998–2000

Background: Worldwide, many of the 600,000 annual pediatric HIV cases could be prevented if research results were translated into large-scale programs to prevent perinatal and breastfeeding HIV transmission. A pilot program was conducted in Thailand; pregnant women were offered HIV counseling and voluntary testing and HIV infected women were offered antenatal zidovudine (AZT) prophylaxis and infant formula.

Methods: Monthly reports from the 90 public hospitals in the region provided coverage data. Infection outcomes were determined for a convenience sample of HIV exposed infants by dried blood spot HIV-PCR testing. A cross-sectional interview survey provided information from a subset of HIV infected women who delivered in the region during the program period.

Results: Over two years, 121,545 women attended antenatal care, 85% were tested for HIV and 960 (0.9%) tested HIV positive. 153,101 women gave birth, of whom 29% received antenatal care in another district and 1% no antenatal care. Of the 106,426 women with documented HIV results at delivery, 918 (0.9%) were HIV positive and 637 took AZT during pregnancy. The overall mother-to-child HIV transmission risk was estimated to be 9.6% (95% confidence interval: 6.4–13.5%). With breastfeeding and no interventions the risk is estimated

to be approximately 25%. Of 162 women interviewed, 128 (79%) reported AZT use although 34% expressed concerns about involuntary disclosure of their HIV status and 38% about potential adverse effects. Two (1%) women refused AZT prophylaxis. All women used formula despite concerns about disclosure (63%) and side effects (63%).

Conclusions: This large-scale HIV prevention program was both feasible and effective in Thailand. Information from participants is critical to monitor potential adverse effects and improve counseling services.

Key words: disease transmission, vertical; anti HIV agents; pregnancy; program evaluation

2:35 ***Maria V. Cano, M. Phelan, S. Mirza, G. Ponce-de-Leon, M. Sattah, T. Gardner, E. Graviss, R. Hamill, D. Rimland, R. Hajjeh***

The Changing Epidemiology of Cryptococcosis Among Persons with AIDS — Atlanta and Houston, 1993–1999

Background: Cryptococcosis is the most common systemic fungal opportunistic infection in persons with AIDS. We conducted surveillance for cryptococcosis to follow the trends in the incidence and changes in demographic and clinical characteristics of this disease in persons with AIDS.

Methods: Active, laboratory, population-based surveillance was established in metropolitan Atlanta and Houston (population 6.6 million) during 1993–1999. A cryptococcosis incident case was defined as a positive culture for *Cryptococcus neoformans* from any body site, detection of cryptococcal antigen in blood or cerebrospinal fluid or consistent histopathology Medical records were reviewed for demographic information, underlying illnesses, medications and hospitalizations.

Results: During 1993–1999, 1,255 incident cases of cryptococcosis occurred in Atlanta and Houston; 1,134 (90%) were in persons with AIDS. Of these cases, 977 (86%) were in males and 670 (59%) were in blacks; median age was 36 years (range 7–86). The annual incidence per 1,000 persons with AIDS decreased significantly (χ^2 for trend, $p<0.0001$) between 1993 and 1999 (32 to 10 in Atlanta, and 23 to 5 in Houston). Cryptococcosis patients in 1997–1999 were significantly ($p<0.001$) more likely to be black and receive care in public hospitals compared with patients up to 1996, the year when highly active antiretroviral therapy was introduced. Recent cryptococcosis patients were severely immunocompromised (median CD4: 30/μL; 68% with high viral load [>50,000 copies/mL]), and only 39% used any antiretroviral drugs.

Conclusions: Persons with AIDS developing cryptococcosisin the late 1990s were more likely to be black and have limited access to care. More efforts are needed to improve access to medical care among these high-risk persons with AIDS to improve control of cryptococcosis

Key words: cryptococcosis, acquired immunodeficiency syndrome, epidemiology, opportunistic infection

2:55 ***Denis Nash, J. Fordyce, T. Singh, L. M. Lee, S. Forlenza***

Mortality and Survival Among Reported Acquired Immunodeficiency Syndrome Cases — New York City, 1993–1998

Background: Although deaths related to Acquired Immunodeficiency Syndrome (AIDS) peaked in 1994 in New York City (NYC) (n=7,689), highly active antiretroviral therapy (HAART) and chemoprophylaxis for opportunistic illnesses have caused substantial reductions in deaths. However, recent surveillance data indicate that these declines have slowed, with 2,402 deaths in 1998 and 2,276 deaths in 1999.

Methods: We characterized trends in the determinants of survival among HAART-era cohorts of reported AIDS cases (defined as persons alive at the beginning of each calendar year during 1993–1998), and conducted Kaplan-Meier survival analysis and Cox proportional hazards modeling of the time from the beginning of each successive cohort's baseline year to death. Cohort-specific multivariate models were adjusted for sex, age, race, borough, human immunodeficiency virus (HIV) transmission risk category, and time since diagnosis.

Results: After multivariate adjustment, disparities increased over time among all cohorts alive at the beginning of each year (1993–1998). In 1998, for example, females were more likely to die than males (relative risk [RR] =1.2, 95% confidence interval [CI]=1.1–1.5), blacks were more likely to die than whites (RR=1.4, 95%

CI=1.1–1.7), and injecting drug users (IDUs) were more likely to die than men who have sex with men (RR=1.7, 95% CI=1.4–2.1).

Conclusions: During the period 1993–1998, New Yorkers reported with AIDS who were female, black, and IDUs have experienced poorer survival rates than other persons diagnosed in the same calendar year. More targeted studies are needed in NYC to determine why these disparities exist, given that medical care is available free of charge to all HIV-positive New Yorkers.

Key words: AIDS, HIV, survival, New York City, racial-ethnic disparities, time trends, mortality

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Dengue Surveillance in Relief Workers in Puerto Rico Following Hurricane Georges, 1998.

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